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The Farmer's Digest

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The Farmer's Digest

Volume 7 October, 1943 Number 5

Three-Minute Milking

Condensed from Successful Farming

C. E. Zehner

University of Wisconsin

FEW recommendations can be made to the dairyman that will show results as quickly as a rapid milking program. Three-minute milking, now being followed here with the University herd, shows great promise for the short-handed dairyman.

Aside from the time-saving advantage, once the shift is fully made, this plan reduces stripping, and permits steps for mastitis control. All of these things can be accomplished without cutting production.

Success in fast milking depends on a preliminary massaging of the udder. Recent research at several experiment stations has shown that the "letting down" process is stimulated by substances called hormones which are secreted within the body of the cow. These hormones are produced following manipulation of the cow's udder, such as washing or massaging, and usually within a space of seconds the milk is "let down."

Every dairyman is familiar with this reaction. It is also known that the hormones responsible for the "letting down" of milk are active for a very short time, and therefore as much milk as possible should be removed while the cow is able to help speed the process.

A cow is a creature of habit and will become accustomed to rapid milking if it is carried out in the same interval of time every milking. This is especially true when the milking time is reduced to a point where no distress is associated with the process.

In the conventional system of milking, with one man operating two units, it is extremely difficult to carry out all the steps required without leaving the units on the cows longer than is desirable. There is also a very wide variation in the time required to make the change, as the milker may come to a cow with a considerable amount of strippings, or have a can of milk to place in the

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cooler. It is quite obvious that when something of this sort happens the unit may remain on the next cow for possibly eight or nine minutes, even tho she may have been milked out in two or three minutes. If this cow should continually follow a heavy stripper she would soon acquire the habit of milking slowly.

In this rapid milking system one man, known as the operator, prepares the cows and moves the unit from cow to cow. The other man, known as the stripper, checks the job done by the machine on each cow, carries milk, weighs, and records the weights.

With the system as outlined above, two men can handle three single units and milk about fifty cows an hour. It is also possible for them to carry out sanitation and mastitis control steps which they could not do if they were working individually. The procedure may sound rather complicated, but it is not difficult after a few days' experience and with the various steps well in mind.

The operator prepares the cow by thoroly washing the udder and teats, using very warm (130°F) chlorine water (250 parts per million of chlorine, or 1 level tsp. BK powder to 2 gals. water). He then takes one or two full hand squeezes from each teat, in the strip cup.

This preparation aids in producing clean milk and helps to "spot" cows giving abnormal milk. It also assists very greatly in stimulating the "letting down" process, which is all-important in this fast milking program. Each wash cloth is used for one cow only and then thrown into an empty pail on the wash cart.

The milker applies the unit immediately and turns the three-minute egg timer, which is a gadget resembling a miniature hour glass. Other timing devices may also be used to indicate when the unit should be removed. The unit removed, the operator dips the teat cups in clean water, and then into the warm chlorine water. He then applies the unit on the next cow which he has just prepared as above.

The operator handles all three units in rotation in this manner. There is a decided advantage in having a milker outlet for each stall so that the operation is not scattered too badly.

The stripper checks each cow just as soon as the milker is removed. This is done with full hand squeezes and should not be carried out excessively, as it will reduce the machine efficiency after a time. Each cow is stripped into her milker pail, which is equipped with a slip cover. The stripper then weighs and dispenses the milk.

When the pails are returned they are placed behind the next cows to be milked. This provides

the operator with a transfer pail for his pail head, to be placed on the next cow.

As soon as stripping is completed, each teat is dipped into a small, long-handled dipper of chlorine water (200 p.p.m., or slightly less than 1 level tsp.) which is discarded after use on each cow. By carrying two milk pails at a time the stripper is able to stay immediately behind the operator. The stripper also changes strainers in cans and places cans in cooling tank.

Altho this system of milking includes sanitation and mastitis control procedures not ordinarily used by the dairyman, he should be cautioned against a feeling of false security in the mastitis control of his herd. We are assuming that all dairymen will continue the practice of milking last, any cows that are questionable as measured by mastitis tests. It is, however, only reasonable to believe that this system of milking, associated with good dairy management practices, should assist in maintaining udder health in our dairy herds.

In a nine-day period preliminary to the start of our team system it took two men with four units an average of 31 minutes to milk the 20 cows used in this trial, with an average time of 5.4 minutes that the unit remained on each cow. During this period the herd produced an average of 567.7 pounds of milk, with 14 cows requiring stripping for a total of 35.4 pounds per day.

During the first six days that the team system was used, it took the same men with three units 30 minutes to complete the milking. Each cow was limited to a three-minute period. During this time this herd produced 574.3 pounds milk per day, with considerable stripping. At the start of this period the time was abruptly reduced to three minutes instead of gradually reducing the time. This procedure resulted in a great amount of stripping for a few days, but within two or three days a large proportion of the cows began to respond. We believe that one change of milking time will affect the production less than several smaller changes.

In the next period of 16 days the milking time was reduced to 23 minutes and the strippings were reduced to 24.4 pounds per day. As was the case in the preliminary period, 14 cows required stripping. The production was not materially affected, as they averaged 577.1 pounds per day.

During the last period of 23 days the milking time remained the same, but only six cows required stripping for an average daily total of 12.6 pounds. The total average production of the herd was 574.4 pounds per day.

At the end of this 54-day period, the cows went on pasture,

and no more data were collected.

It is quite obvious that after a transition period of about one week, this system saves time, reduces stripping, and at least maintains production. It also permits steps for mastitis control that cannot be carried out otherwise without increasing the milking time which is already too long. The bacteria count, approximately 8,000 prior to the initiation of the project, was reduced to 5,500 when the new stystem started.

Some dairymen may shy at this mechanical method of milking cows. They may feel that they have too many cows that will not milk out in three minutes. This will be true in about 5 to 10 percent of the cows in most herds. All cows that will not respond to fast milking should be moved to the end of the string to prevent breaking up the routine in the middle of a milking line.

For fast milking, use vacuum recommended by the manufacturer of your machine. As in full milking, you will get better results in the rapid process if you maintain good inflations.

Some dairymen will say they have no help for a system of this sort, or that they do not care to work so fast after a day's work in the field. There are many modifications of the system described that may be devised to fit nearly any situation. The dairyman who has a hired hand or son to help but does not care to work so fast may use only two units. The man who is alone can do his milking nearly as fast with one unit as is ordinarily possible with two, and still do a better job of milking. Another advantage of this system is the fact that it enables hired help without special dairy training to do a more efficient job of machine milking with very little supervision.

The important thing is to set the time for the unit to remain on the cow and then stay with it until she becomes trained. It is only reasonable to expect heifers and cows just starting a lactation to respond more readily. The many advantages of the program will not be realized until it has been used for about one year. But it's worth a try.

From Broomsedge to Alfalfa! New Seeding Method Does the Trick

Condensed from The Ohio Farmer

E. W. McMunn

FROM broomsedge and poverty grass to meadows that produced an average of 2½ tons of alfalfa-grass hay the year after seeding! This is the transformation which has occurred on eroded, unproductive hill land in Muskingum County, Ohio, where H. L. Borst of the Soil Conservation Experiment Station at Zanesville has been testing a new method of establishing legume seedings.

Making the jump from worn-out, practically abandoned pasture lands to luxuriant crops of alfalfa sounds almost too good to be true, but for eight seasons now Borst has been successful in establishing these seedings on just that kind of land.

And that's not all the story! These old fields are not plowed, but instead are disked, leaving the soil covered with a residue of vegetation that prevents erosion until the new plants get a good start.

Lime, fertilizer and disking rather than plowing are cornerstones of this program. Before any legume can be grown successfully acidity of the soil must be corrected and the application of lime is thus the first step in this program. Amount necessary will vary, but on most southeastern Ohio hills it probably will take two to three tons per acre. Lime may be applied any time before making the new seeding, the earlier the better.

Preparation for seeding is simple. This consists in disking the ground thoroughly in late March or early April, just as soon as it can be worked in the spring. The field should be well disked but not worked until it is too fine or dusty. The old vegetation forms a valuable protection against erosion and should be left at or near the top of the ground.

Another step in establishing these legume seedings is the use of fertilizer, either 0-14-7 or 0-12-12 at the rate of 350 to 400 pounds per acre. Borst warns that neglecting to fertilize may result in seeding failures. The fertilizer should be drilled into the ground either at the time or before the seed is sown.

A number of seeding mixtures

Reprinted by permission from The Ohio Farmer, August 7, 1943

have given good results, but inclusion of a grass in addition to the alfalfa is recommended to give better erosion control, reduce weed growth and increase yields. Some recommended seed mixtures are as follows: Alfalfa 10 pounds, timothy six; alfalfa 10, orchard grass five; alfalfa 10, alsike two, timothy six; or alfalfa 10, ladino clover one, timothy six.

The legume seed must be inoculated. The mixture may be seeded broadcast or with a grain drill with grass seed attachment. It is well to cultipack the seed bed just before seeding. To control weed growth during the first season, the weeds should be clipped once or twice, whenever they reach a height of eight or 10 inches.

Cost of this new seeding method may appear high at first glance, but as Mr. Borst points out, the first year's crop of high-quality legume hay should more than pay for the cost of establishing the crop. This mixture, once established, lives for a number of years. In fact, at Zanesville, fields seeded five years ago still have a fine, thick stand of alfalfa.

Not only has this seeding method proved successful at Zanesville, but it has also been tested at a number of other places including Coshocton and the Ohio Experiment Station at Wooster. At the Wooster Station R. E. Yoder, chief in agronomy, reports seedings started by this method have been satisfactory and have heavy crops on land that was reclaimed from a sparse covering of low-quality grasses and weeds.

Not only does this "trash mulch" method of seeding alfalfa on worn-out badly eroded hillsides produce a good feed crop at once, but it goes far to restore again this land to profitable production. The heavy growth of vegetation practically stops further erosion. Since the crop will produce for a number of years the land will not again lie bare for erosion to take its toll. And the alfalfa, once introduced, will return valuable nitrogen to the soil.

After observing success of this seeding method at both Zanesville and Wooster, Borst and Yoder are convinced that here is the opportunity for many farmers with non-productive pasture and waste lands to get them back into a useful crop. They recommend that farmers start with a small area at first, improving other areas if they are satisfied with results.

How Britain Does It

Condensed from The Nation's Agriculture

J. A. Scott Watson

Agricultural Attache of the British Embassy at Washington

THE objectives of the British War Time Agricultural Policy are:

1. To ensure full production on each acre of British land.

2. To achieve maximum output with minimum manpower.

3. To distribute machinery, seeds and other supplies so as to bring maximum returns.

4. To control prices, wages, rents, credit and taxes so as to encourage greater production but prevent inflation.

The Minister of Agriculture has the power to direct farmers in the operation of their farms. Failure to follow orders is punishable by fine or imprisonment, or both, and finally by eviction. Most of his powers have been delegated by the Minister to unpaid county war agricultural committees which employ salaried staffs.

In the great majority of cases, the individual farm program is agreed to between the farmer and the visiting committeeman. If the farmer objects to his assignments, he may ask for a review of his case by the county committee, but there is no appeal from the latter's decision.

Farm work is a "reserved occupation." A farm worker cannot enlist, be drafted, or transfer to other work without permission. So far, we have had two drafts of farm workers. This drain on manpower, plus a nearly 50-percent increase in cultivated acreage, has made it necessary for us to train substitute labor. School and college students, soldiers on special furloughs, prisoners, and part-time women and businessmen have all rendered valuable service, but the greatest contribution has been made by the Women's Land Army, now numbering more than 50,000 of whom 25,000 enlisted voluntarily. The others elected farm work in preference to other women's services or to war-plant work. After four weeks of training, members are sent to movable gangs which move around as needed, living in camps—or to individual farms in case they are to be permanent employes on one farm. Many are skilled tractor operators and milkshed workers, and many do all

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tasks that hired men customarily do.

New machinery is rationed by the War Agriculture Committee. If the applicant cannot use the machine full-time, he must agree to do custom work for his neighbors, at approved rates. Second-hand machinery may not be sold for more than the original cost of the machine. The Government owns about seven percent of the farm tractors, mainly heavy crawler types required for special work, such as land reclamation. Each county war committee maintains a machinery pool, to be used on a custom basis.

A special machinery officer of the county war committee looks after repairs and servicing, and also organizes "neighbor help" groups in the communities.

At the outbreak of the war, many British farmers were so badly in debt that they could not get additional credit. Government loans helped this situation to some extent, but it was helped much more by offering prices, in advance, sufficiently high to ensure profit. After that, bankers and merchants supplied additional credit rather freely. The Government offered special inducements to farmers to bring semi-derelict land back into production.

The Government pays half the cost of liming. It pays twelve dollars an acre for plowing up old pasture, and an initial payment of forty dollars an acre for potatoes, which are a key crop. These payments help the farmer who is working under adverse conditions. The more fortunate farmer is prevented from making excessive profits by profit "ceilings." A large farmer can claim a profit equal to what he made in the basal pre-war year, or, alternatively, a maximum of six thousand dollars a year. The excess is taken by the Government.

This system has its drawbacks. With the profit motive completely absent—as it is on farms of a few hundred acres—there is an obvious temptation to hide away profits in the form of soil fertility. Also the rather fantastic prices that are being paid for purebred livestock are largely the consequence of this tax.

Minimum wages for hired men, about thirty dollars a month before the war, were first raised to forty dollars, and later to fifty-one dollars. The minimum work week is fifty hours, with overtime paid for at higher rates. The last rise was offset for the employer by increased prices for his produce.

In Scotland it was found necessary to prohibit back-to-farm movement of workers except by consent of county committees. In England it has not been found necessary to "freeze" hired men to individual farms.

So far, there has been little inflation of land values, although farms that are sold with actual possession have risen somewhat. Rented farms, which are a large majority, have risen in value very little because no more than a "fair rent" (as fixed by arbitration) may be exacted and because tenancies can be terminated only with the Minister's approval.

Britain has not hesitated to use subsidies in order to prevent a rise in living costs. If it is desirable that the consumption of potatoes or milk be increased, then subsidies are paid. Conversely, if it is held desirable that consumption of whiskey or tobacco be curtailed, then a heavy tax is applied. The present price of tobacco in Britain is eight or nine dollars a pound.

One other point about price-fixing is perhaps worth mentioning. The set price, or the ceiling price, or floor, or ceiling and floor prices are announced a long way ahead. Thus the British farmer knew last July the price—about $1.60 a bushel—that he would receive for his 1943 crop of wheat. He knows now what the prices of cattle will be, according to grade, till next June, and so on. And he knows that if wages, or feed or fertilizer prices should rise in the interval, a proportionate adjustment will be made.

Possibly you will ask how it is that the British farmer, who has always been a strong individualist, has been persuaded to stand for all these measures of control. Partly it is just that the whole weight of public opinion supports the principle that nobody shall be free to do less than his part in the war effort. Partly it is because the administration of government policy, on the individual farm, is done mainly by the farmer's own neighbors. And, finally, we have preserved our British right of free speech. The British farmer can still grumble to his heart's content.

Ready-Made Buildings

Condensed from Farm Journal and Farmer's Wife

K. J. T. Ekblaw

MOST farmers have been their own carpenters in days gone by, whenever a small building was needed to take care of the chickens or pigs or an extra few hundred bushels of grain. But times have changed and conditions are different now; building isn't the relatively simple problem that it used to be.

The pressure of war demands has reduced the supply of lumber and many other building materials; there just isn't enough to go around. The government has found it necessary to restrict the distribution of materials, but even so, it has recognized the importance of farming by making relatively generous allowance for farm buildings.

Farmers can still have about all the buildings they really need; their problem is to make sure that the money spent for farm buildings is spent most wisely, and that the material that goes into them is used to best advantage. Right there is where farmers have to do some serious figuring, and maybe revise some of their old ideas on building.

A new building word has come into use in recent years — prefabrication. It represents an idea that fits in pretty well with modern times, and especially with the war economy under which we must work.

Applied to farm buildings, prefabrication means that the buildings are put together before they reach the farm. In short, they are ready-made. Luckily, many of the farms buildings that fit into modern systems of farming are rather small. Small buildings are adapted to the ready-made idea, and so pre-fabrication is swinging into the farm field with more than usual speed and force.

Smart farmers are finding in the ready-made buildings a good answer to their building problems. The building material dealers have, in a way, pushed it onto them, for dealers have been "up against it," too, in meeting the materials situation.

The dealer has had to sell what he could get—odd lots, odd sizes, sometimes even odd materials—and he has found that he is in a better position to put them together than the farmer is himself. The dealer had odd lots he could combine; he could afford to use labor-saving equipment; he could follow so-called "mass-production" methods and save time and labor; he could keep his operators busy in slack times.

Reprinted by permission from the Farm Journal and Farmer's Wife, Philadelphia, Penna., August, 1943

All of these things enabled him to cut production costs so low that he could lay completed buildings—poultry houses, range shelters, swine houses, grain bins, feeders — down on the farmer's place cheaper than the farmer could build them himself.

Farmers like the idea, too. To them pre-fabricated buildings means less worry and trouble. To begin with, these buildings are pretty certain to be fairly standard so far as their usefulness is concerned; no dealer is going to make up a lot of valuable material for sale unless he knows that the resulting buildings stand the inspection and have the approval of the farm buildings specialists in the state college and extension department.

The farmer gets the benefit of carefully selected materials and workmanship; the right material is in the right place, the various parts fit well together, and when a brace is needed, it's there. Building a dozen or a hundred of the same kind of houses naturally results in speed and economy of construction, and the farmer gets his share of the saving.

Pre-fabrication can be worked out in various ways. Some dealers have specialized in completed buildings that could be loaded on a flat truck and hauled right out to the farm. This has been true especially in the case of brooder houses and individual hog houses. On some types of buildings the walls, floors and roofs are nailed together at the lumber yard, then hauled to the farm and assembled. Many a grain bin, garage, laying house or corncrib has been acquired by farmers under just such a plan.

For example, in that section of northern Indiana around Warsaw and Rochester, where poultry raising is really big business, hundreds of ready-made chicken houses have been hauled out from town and put into use with scarcely an hour's delay, to meet the insistent demands for "More eggs!" Likewise, in pork-producing Iowa, almost every county has some outstanding, aggressive dealer who has come to the aid of swine growers with ready-to-use shelters for pigs.

Farmers are getting acquainted with some new kinds of material, too, in these small buildings. With sheet metal being reserved for war uses, and with lumber getting scarce, builders have had to cast about for substitutes. Plywood was popular until it, too, began to be scarce. Wallboards, specially treated and waterproofed to withstand exterior exposure, are now being used. Elaborations of the asphalt theme are finding many useful applications for emergency building. Pre-cast boards of gypsum materials are being used for various "duration" structures.

Rabbit as You Like It

Condensed from New Jersey Agriculture

W. C. Thompson

Professor of Poultry Husbandry

THE rabbit fryer (and that is the stage of development at which the young rabbit should be slaughtered for delicious, tender meat) is a rabbit weighing 3½ to 4 pounds, live weight, and is 2 to 3 months old. This fryer, when killed, bled, skinned, and dressed, will yield a carcass which weighs from 50 to 55 percent of its live weight; and, of this dressed carcass, approximately 80 percent will be edible meat. The average fryer weighing four pounds alive, will yield almost one and three-quarters pounds of edible meat.

The fryer is usually cut into 9 pieces, each hind leg making two pieces, the back three pieces, and each foreleg one piece. The rabbit heart, liver, and kidneys are good food and may be cooked along with the regular meat parts.

Five Ways of Cooking Domestic Rabbit

Domestic science experts will probably know of many more ways in which to prepare rabbit meat for the table than these five oft-tried recipes here given; but these seem to have stood the test of time rather well.

Baked Rabbit.—For this dish the rabbit carcass, well-washed, is cut into two parts only, by splitting lengthwise along the backbone. Each half is rubbed with a bit of salt sprinkled with pepper, and is then laid in a roasting pan and dredged with flour. A strip of bacon is laid across each half, and three cups of white sauce are poured over and around the halves. The rabbit is then baked about 1½ hours, basting frequently. It is served with the cream gravy, of course.

A variant of this recipe would fill the halves with regular stuffing.

Fried Rabbit. — Cut the fryer (weight about 1¾ pounds) into the usual pieces, wash, and wipe with a damp cloth. Add 1½ teaspoons of salt and ⅛ teaspoon of pepper to one egg, well-beaten. Dip the rabbit pieces in this mixture, and roll each in dry bread crumbs. Brown, to suit one's taste or to a rich golden brown, in ¼ inch of hot fat. Then reduce heat, cover, and cook slowly for about 30 minutes longer, or until tender.

Rabbit Pie. — This recipe uses

Reprinted by permission from New Jersey Agriculture, New Brunswick, N. J., May-June, 1943

the rabbit cut into nine pieces. Wash carefully, and place in a stewing pan. Cover with boiling water to which has been added 1¼ teaspoons of salt. Cook slowly for about 1¼ hours, or until tender. Drain off the broth, and save it. Remove the meat from the bones, which will not be difficult, and cut it into small bits. Melt 3 tablespoons of butter or other available cooking fat in a saucepan, add about 3 tablespoons of chopped onion, and ½ cup of chopped green pepper. Cook for about 5 minutes, or until tender. Blend 3 tablespoons of flour, 1¾ teaspoons of salt, and one-eighth teaspoon of pepper and then stir into the broth. Boil the mixture 2 minutes. Add the diced meat and bring it all to the boiling point. Cover the baking dish with potpie crust. Bake in a hot oven (425°) for 20 minutes, or until the crust is brown. This pie is delicious. It will make new friends for the domestic, grain-fed rabbit.

Rabbit Stew. — In these war days good, old-fashioned meat stews, in which home-raised vegetables have been cooked as well, can be favorite meals. Rabbit meat is excellent for this. Cut the rabbit carcass into the usual nine pieces. Cover with cold water and bring to a boil. Cook gently until almost tender. Add 4 medium-sized potatoes cut into small dices, 4 large carrots cubed, 1 medium sized onion sliced or diced (and any other vegetables at hand or desired). Cook the whole until both meat and vegetables are tender. Add salt to taste. Thicken the liquid (without removing the meat or vegetables, of course) with flour mixed with cold water as usual in gravy-making. Serve on a hot plate. And it's mighty good, too.

Rabbit Salad.—Some time ago the writer sat down before two salads. One was made with white meat of chicken and the other with domestic, grain-fed rabbit. He could not differentiate between the two salads. Rabbit meat salad is delicious, nutritious, and economical.

A 1¾ pound fryer rabbit makes about 2 to 2½ cups of diced meat when cooked and made ready for the preparation of the salad.

One may use whatever vegetables one wishes or likes in a rabbit meat salad; but a suggestion is 1½ cups of finely chopped celery, ½ cup of chopped sweet pickles, as a delicious mixture to blend in with the diced rabbit meat. Over this pour about ½ cup of mayonnaise dressing; mix thoroughly, add a bit of lemon juice, to taste; pour onto a dish lined with crisp, green lettuce leaves. Chill. Serve. Garnish with sliced hard-boiled egg, and a sprig or two of parsley.

Seven Tips on Housing Pullets

Condensed from Everybodys Poultry Magazine

Frank D. Reed

MOST poultrymen, if you ask them, will tell you that they get the most satisfaction from their job when they house the new pullets.

"Housing time" is a short but extremely important period. Mistakes at this time can have a serious effect on the performance of the birds in the laying pens. Many of the "upsets" with newly housed pullets and much of the mortality variously attributed to anything from coccidiosis to "blue-comb" or "pullet disease" is, I am convinced, due to nothing more or less than mistakes in housing.

1. *Give the Pullets a Clean Start* — Newly housed pullets should be given clean, sanitary quarters. Most poultry diseases are carried from one generation of birds to the next either through infected premises or through the mingling of the younger birds with the old hens. So, keep in mind these two common sense rules:

First, never house pullets in the same pen with old hens — preferably not even in the same building.

Second, thoroughly clean and disinfect the pens.

2. *House When Ready to Lay* —Birds are ready to be moved to their permanent quarters when they are ready to lay. This is a general rule, and it is subject to exceptions. Generally, housing birds when they first start to lay means less upset, less likelihood of a slump. It means better production, much better egg quality, and less difficulty in teaching birds to lay in the nests. One exception would be the case of early hatched pullets starting to lay in the hot weather of July and August. Such pullets might be better off on range than housed if the laying quarters are uninsulated and hot.

3. *Sort Pullets According to Development*—Birds, even birds of the same strain, do not all mature at the same age, and this variation even in healthy birds is sometimes as great as 6 to 8 weeks. The earlier maturing birds are more aggressive and invariably dominate the slower developing individuals. If any sizable number of birds of one age are raised—for example, 300—it will

Reprinted by permission from Everybodys Poultry Magazine, Hanover, Penna. July-August, 1943

be found that the flock divides nicely into thirds. Each of these groups should be housed separately if possible at about two-week intervals.

4. *Cull the Pullets When Housing*—All management efficiency studies with poultry are in agreement that full laying pens mean more profit than pens only partly full. One of the best ways to assure full laying pens, that will not immediately be depleted through mortality and necessary culling, is to raise a surplus of pullets and to cull heavily at housing time, retaining only the choicest birds. This surplus of pullets beyond housing capacity should be from 10 to 20 per cent, preferably the latter, for if rearing turns out to be more successful than expected, the extra birds can be sold at a good profit.

Handle each bird individually. Reject thin birds, birds with gray, diseased eyes, and the extremely slow maturing birds. Do not attempt to go further than this. Even an "expert" cannot pick the 150-egg birds from the 300-eggers at this stage of development.

5. *House in the Evening* — Without question, the best time to catch up birds on the range and move them into the laying quarters is in the evening—just after dark. They can be caught up at this time with little flying around, fright or confusion. They can be placed directly on the roosts in the laying pens, and much of the grief in training birds to roost experienced in daytime moving avoided.

The only difficulty in moving birds at night is that it is harder to do an accurate job of culling. However, the type of culling suggested (mainly on weight, plumpness, comb and abdominal development) can be done largely by "feel" rather than sight.

6. *Handle Birds Carefully* — The ready-to-lay pullet is in much the same condition as the pregnant animal. Pullets must be handled gently to avoid ruptured egg yolks. After housing, the caretaker must avoid frightening the birds. Some poultrymen even make it a practice to knock on the door before entering the pen. Avoid sudden movements, push pullets aside instead of kicking them. Much of the mortality occurring shortly after housing attributed to various diseases ("blue-comb" is our popular term in New England) is the result of rough handling of birds.

7. *Feed Green Feed* — The change in environment from free grass range to close confinement with no green feed is a drastic one. As long as green feed is available, continue to give it to the layers. Lawn clippings, green Ladino clover, alfalfa, or rape at the rate of 4 to 6 pounds per 100 hens daily is not only an important method of saving on pur-

chased feed, but helps to assure better nutrition of the laying birds. Grass is a particularly good source of vitamins, especially vitamin A. Take this suggestion on green feed seriously; it is particularly important at this time, with the feed situation what it is.

These are just a few of the considerations in housing pullets. The matter of building up a deep litter in the laying pen before cold weather, as a method of insuring dry litter next winter, is important — but that is another story.

Wheat Straw Goes to War

Condensed from Kansas Farmer

Even wheat straw can go to war! Is going to war! And like so many other things, there is a shortage of it and therefore it is in demand. Plants manufacturing thousands of tons of strawboard and kindred products need many thousands of tons of baled wheat straw to make packages used for shipping airplane parts, shells, bombs, fuses and certain other munitions, in the general direction of Tokyo and Berlin. Wheat straw also makes the containers for Lend-Lease shipments to our Allies; packages made from Kansas wheat straw that carry Kansas-grown food to the folks fighting on our side.

There are many other uses for straw, the by-product of the wheat crop. You already know it makes egg-case fillers, corrugating material for shipping glass containers and canned goods, and packaging photographic plates and other rather delicate goods.

Sometimes certain mills have their own so-called baling outfits; that is, they have regular men who bale year after year for them, and whom they assist in buying necessary wire, equipment and repairs. Many times, also, the mills assist in getting crews together for the actual baling. In these instances the head balermen will go from farm to farm in certain communities, purchase the straw and proceed to bale it as soon after the harvest as possible. Pickup balers or even homemade straw stackers are needed for this job.

Interesting Feeding Experiment

Condensed from Farm and Ranch

B. C. Davis

Supervisor, Vocational Agriculture, Area 8, Austin, Texas

ONE of the most interesting feeding experiments that I have seen was conducted by the vocational agriculture classes at Elgin this spring, under the supervision of J. Z. Hattox, teacher of vocational agriculture.

The boys built a trailer in their farm shop, putting a partition in it and also building a self feeder in each half.

Two Berkshire pigs, litter mates and almost identical as to size, type and color, were purchased by the class and placed in the trailer. An opening ceremony for the project was held on the school campus February 9, when the pigs were weighed and assigned certain feeds. Some 70 students observed the beginning of this feeding experiment and served as witnesses later in the spring when certain facts were needed.

The 53-pound pig named Mike was fed yellow corn and a 40 per cent protein supplement and clear water. The 55-pound pig named Pat was fed yellow corn and clear water. These animals were weighed each 30 days and the weights and cost of feed recorded on a blackboard on the side of the trailer. Each Saturday the trailer was pulled down town and parked on the main street for the day. Much interest was shown in the project and many people argued that these pigs were not even litter mates.

Final results were determined at the end of 81 days' feeding. On May 1 Mike weighed 230 pounds and Pat weighed 85. Mike was sold at 14.15 cents per pound and Pat was transferred to Mike's half of the trailer so that he might have access to protein supplement. His gain for the first 14 days was 31 pounds as compared with the 30 pounds during the entire 81-day feeding period. The cost per pound of pork put on for the 81-day period was 7 cents for Mike and 13 cents for Pat.

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Stretch the Pasture Season

Condensed from Eastern States Cooperator

"Ken" Paine

Eastern States Seed Service

EVERY day that cows can be on abundant pasture saves just that much barn feeding and the labor and expense which go with it. The pasture season can often be extended on both ends with seedings of small grains.

Winter rye has in the past been most used for this purpose. If sown by late September, it makes much growth that fall and furnishes the very earliest pasturage the following spring. It usually survives the winter well even when sown the latest of all crops in the fall. If seeding is followed by only enough moisture and warm weather to induce sprouting, a seeding of winter rye will likely survive the winter, although such a seeding will not give as early, vigorous growth in the spring as will seedings made early enough to permit more fall growth. Also such late seedings are of little or no value in preventing winter soil erosion or for other cover crop benefits.

Despite the virtues and popularity of winter rye, a real shortage of seed in 1943 and probably future years will make it necessary for many who would like to seed rye to use some substitute. Probably the best substitute available is winter wheat. Its performance is much like rye but very late fall seedings must be avoided and early growth in the spring is not quite as vigorous and abundant as with rye. For the latter reason it is somewhat easier to handle satisfactorily and to keep in a desirable pasturing condition over a considerable period in the spring.

Winter barley is another desirable crop for this purpose in areas where winters are not too severe, as in southeastern and south central Pennsylvania, and in Delaware and Maryland. It has been tried in recent years in the Connecticut Valley of southern Vermont, and while it made splendid growth in the fall, it did not survive the winter at all satisfactorily.

Some farmers like to sow a mixture of spring barley and winter rye or winter wheat. The spring barley produces abundant pasturage in the fall but dies out

Reprinted by permission from Eastern States Cooperator, Aug., 1943, Springfield, Mass.

over winter, leaving the other grain alone for spring production. Oats are also sometimes used in the same way.

With any of these grain seedings, spring feed production can be materially increased both in quality and quantity by the inclusion of hairy vetch in the seeding. It is a legume and should be adequately inoculated. A good proportion of vetch in a grain pasture will increase the percentage of protein and make it necessary to purchase less of this critically scarce nutrient in the concentrate grain ration. Vetch makes best growth on light soils but usually does well even on clay soils if they are well drained. It makes little top growth but tremendous root growth in fall and winter and then very rapid top growth the following spring.

Seedings including vetch should be made by the middle of September so that the vetch can make sufficient growth before freezing weather to endure the winter. The amount of seed to sow per acre is about 100 pounds —either of the grains alone or 70 pounds of grain and 30 pounds of vetch when the mixture is used.

Earth-worm Tillage

Condensed from New England Homestead

Christopher M. Gallup

EARTH-WORM tillage helped us to cut down our last year fertilizer bill 14%, reduce the corresponding feed bill by 7%, keep our sales on an even keel, and increase our December 31st inventory of live stock, feed and supplies by 89%. And at that we are just getting started. Biologists who have studied them closely tell us that in really good soil the worm holes or burrows should be about two inches apart. They further assure us that with such spacing, and plenty of dead vegetation to eat, earth-worms would then throw out on top of the ground the best possible plant food at the rate of one ton per acre per week for the growing season.

Foresters have known about this soil-building by earth-worms for many years, but we tillers of the soil have been a bit slow at learning how to use them. We have gone blindly on hiding their food with our mould-board

Reprinted by permission from the New England Homestead, Springfield, Mass., August 7, 1943

plows, instead of leaving it on top of the ground, where for countless eons they (the night-crawlers) have always hunted for it. Anyone can see for himself what this does to the land, by comparing the soil along an old wall where the plow couldn't get in, with that in the middle of the field where the earth-worms have been driven out.

Earth-worms stranded on a dry sidewalk after a summer shower are such a common sight that any statement of their continuous need for moisture would be superfluous. Of course they have it on the surface when the dew is falling, and also when it rains. At other times they go down their vertical holes or burrows until they feel comfortable. We have encountered them while digging drainage ditches during a dry season as much as four feet below the surface.

Dead vegetation has to be "tenderized" by alternating sunshine and rain or by time before an earth-worm can eat it. Judging by what unfavorable weather can do to our hay, it is easy to believe that the vegetable part of the earth-worm's ration is little more than crude fibre or cellulose. Naturally that has to be supplemented or balanced. So far as we are aware, this phase of the earth-worm's requirements has not been subjected to scientific inquiry, but we do know that he "tanks up" with fine particles of earth down below the usual tillage level. Under the influence of his digestive apparatus, and the benign bacteria to which he is presumably host, the insoluble mineral compounds from the lower levels are converted into soluble and highly nitrogenous plant food. This he finally leaves on the surface of the ground, often to the dismay of golf players attempting delicate shots on the putting greens.

Our discovery of earth-worm tillage arose from a determination to seed some winter rye on a gravel knoll, where the top soil had washed away, and the oversized gravel was packed in like paving stones. The heavy sulky tractor plow that we then owned just bumped along over them. As a pure experiment, we borrowed a heavy duty spring tooth harrow from a neighbor, and went over the knoll with that. The flexible teeth found the interstices between the cobbles, and presto, we had a passable seed bed for the rye.

The result of this experiment was so gratifying that we staged a "brag-fest" with the County Agent about it. He in turn suggested using the harrow just after the frost had come out, to loosen and roll out the cobbles nearest the surface. This worked so well that we tried it on the better fields instead of plowing. The nor-

mal tillage season was lengthened about three weeks by this change, and was found to have other advantages. The added time gave us the chance to spread and harrow in our barn manure day by day. The early contact with the soil gave the bacteria that much more time to ripen the raw manure, and convert it into plant food before the crops actually needed it. There was also opportunity to harrow down two or three weed sproutings before it was time to plant.

Now the first-thaw harrowing pulled all the old grass and weed roots up and on the surface, where the alternating rain and sunshine of early spring made them surprisingly brittle. We didn't then know that we were making the finest earth-worm food possible, but the earth-worms moved right out from along the walls, and multiplied like the Israelites of old, only more so. After one or two seasons of harrow tillage, the earth-worm burrows became so numerous that we spotted them along with the soil improvement. From then on it was comparatively simple to plan our cropping, so there would always be something for our little soil builders to eat. In time we hope to furnish them all they can eat.

Since we traded our sulky tractor plow for a new heavy duty spring tooth harrow six years ago, our crop yields have been on the up and up. Starting with an ear corn yield well below the bumper level of 100 bushels per acre, we had the satisfaction in 1941 of husking 147 bushels from one carefully measured acre. More recently we applied the rag doll test to thirty ears selected for our 1942 seed plot, and got vigorous germination 100%, for the first time. By the light of our experience to date, we firmly believe that earth-worm tillage will bring back the soil fertility of colonial times, of which the big houses still standing on many of our hinterland farms offer highly credible evidence.

Hard-Surfaced Floors for Poultry Houses

Condensed from The Dakota Farmer

Ralph L. Patty

Head Department Agricultural Engineering, South Dakota State College

INEXPENSIVE hard-surfaced floors for the farm poultry house have been the desire of poultrymen for many years. The South Dakota Agricultural Experiment Station now has the answer to this problem. Two new floors have been developed that are as smooth and hard on top as concrete and can be built for a fraction of the cost of concrete floors. In fact after being in use for a year or two one cannot tell them from concrete floors. Another advantage of these new floors is that they are made largely from soil and are not as cold as concrete floors.

One of these floors is called a soil-cement floor and the other is called an oil-surfaced floor. The soil-cement floor is designed after a new type of light traffic highway surface that is being tested in several states by the state highway engineers. The oil-surfaced floor is similar to oiled-gravel highway commonly called "black-top" in this section. It has the characteristics of the black top roads but is made in a very different and much easier way. The oil used in this floor is on the list of critical war materials and could probably not be obtained at this time, but the soil-cement floor can be built very readily today. In normal times the oil for the oil-surfaced floor can be obtained in barrels through any oil filling station.

It takes just one barrel of this oil to make an entire floor for the average sized farm poultry house and this is all the material needed outside of the soil and probably a little sand that may be required. When the experimental floors were built three years ago, the oil cost 14c per gallon. This would be $7.00 for a 50-gallon barrel if the barrel is returned. A 50-gallon barrel would build a floor for a 16 by 32 foot house if the maximum amount of oil is used in the mixture and with a few gallons to spare. The experimental floors have been built with different amounts of oil for filler, varying from one gallon to 16 square feet of floor, up to one gallon to 12 square feet. In addition to the filler oil a thin coat is used underneath the top course

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of the floor and a thin coat is brushed over the top of the floor after it is finished so the total amount of oil needed for oil-surfaced floors varies from 9 gallons per 100 square feet of floor up to 11 gallons per 100 square feet. At 14c per gallon for oil, the cost of the oil-surfaced floor was $1.54 for 100 square feet. With cement at 75c per sack the soil-cement floors cost $2.26 per 100 square feet. Regular concrete floors were built at the same time at a cost of $6.35 per 100 square feet.

The soil-cement floor can be built without any priority difficulty. All the materials that are needed are three sacks of cement for each 100 square feet of floor and some soil and sand. This makes the cost $2.26 per 100 square feet as mentioned above. The soil-cement floor will stand harder usage than the oil-surfaced floor and may prove to be satisfactory for use in other livestock barns. They are being tested for the heavier service but no recommendations will be made for them until the results definitely justify it. There is no question that they are satisfactory for use in garages, machinery sheds and farm shops.

The general method of making these floors is the same. The floors are both three inches thick and they are built in two courses of about the same thickness. The bottom course is of hard rammed earth and the top courses or hard-surfaced courses are made very similar. The difference is that asphalt oil is used in the top course of one, and Portland cement is used in the top course of the other. The only equipment necessary for building them in addition to shovels, etc., is a common floor tamper that is used by all carpenters and contractors who do concrete work.

Space will not permit going into detail with the construction but very detailed directions are given for building these new floors in a printed circular—Experiment Station Circular No. 42.

The circular contains a list of steps that are followed in building either of the floors. It may be obtained by writing the South Dakota Experiment Station or the Department of Agricultural Engineering at Brookings, South Dakota.

The circular just came off the press in May and already requests are coming in for it from all parts of the country. Many new poultry houses will be built this fall and many of the old ones need hard surfaced, sanitary floors which no doubt accounts for this active interest. In spite of the extremely busy season many soil samples are being sent in already for laboratory analysis.

The soil used for these floors should be quite sandy and most soils will need to have some extra

sand mixed into them. A rough home test can be made of the soil by one who is careful in following directions.

An accurate laboratory test can be made of the soil at a cost of one dollar to citizens of South Dakota. When this test is made at the laboratory the builder is advised exactly how much sand should be added for the highest quality floor.

When sending for the circular, No. 42, the builder may ask for the "Instruction Sheets" for "Taking and Sending Soil Samples" and also for "Making a Home Test of Soils for Sand." If he wishes to have a laboratory test made of the soils the instruction sheet will furnish the information he needs for taking them and sending them in. If he wishes to make his own test of the soil he will also have instructions for that.

Working at an ordinary careful rate of speed two men will build either of these floors at the rate of about 18 square feet per hour. An experienced crew would build 25 square feet per hour without any difficulty. The leveling and setting up of forms is the same as for concrete.

Less skill is required for building these floors than for concrete and there is less chance of making a poor floor.

Cabbage

Mrs. George Wilhelm, of Otoe County, Nebraska, seals the cut end of each cabbage head with paraffin, then places it in a mesh sack or open crate and hangs it from the roof of the storage cave. Thus prepared, the crop keeps well.

—*Successful Farming*

Wild Rice

Condensed from American Forests

Ormal I. Sprungman

WILD RICE is the most glamorous—and the costliest—of all grains. For years the food of mallards and Indians of the North Country, it is finding new popularity in cities and towns far removed from the shallow lakes where it is harvested. Boiled as dessert, milled as flour, or ground and used as porridge, it is noted for its delicious flavor, and there are many who regard it as possessing some medicinal properties. Sportsmen, of course, have long used it as stuffing for wildfowl.

Ducks, particularly the mallard, feed extensively upon the wild grain. They obtain it chiefly in the mud of shallow water where the matured seeds have fallen. The wood duck feeds on the flowers and stems, and the leaves of mature plants are taken by wild geese.

Only meagre information is available on the annual wild rice crop in the United States and Canada, but Minnesota, claiming some 30,000 acres of this grain with a yield up to 500,000 pounds, probably produces more than any other state. In Canada's province of Manitoba, a peak of 150,000 pounds has been reached.

It is in Manitoba's shallow lakes that the Ojibwa Indians set up their tepees in the harvest month of September and paddle or pole their canoes through the rice beds to tap off the ripe heads. Here also, at Lac du Bois, lives Howard Williams, who for the past twenty years has been working with the Indians at harvest time, and whose mechanical genius has revolutionized the romantic though ploddy redskin manner of gathering, parching, "dancing" and winnowing the grain. Williams probably knows more about wild rice and its harvest than any other living person.

Reaching ten or twelve feet in height, wild rice is particular about the kind of water it grows in, according to Williams. It may be neutral or slightly on the acid side, but must not have an alkaline content. Its depth may range from four inches to four feet, and a sluggish current of around a mile an hour is preferred.

In autumn, the ripe seeds fall into the water, sink and are buried in the soft mud where they remain dormant all winter. In spring, the first leaf to appear is a "floating leaf" which trails on the water surface. This dies off

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when the main stem follows in June. So important is this floater that should heavy rains raise the water level and submerge the leaf before the main stem has reached the surface, the plant will not reseed. Williams believes this may explain planting and rice crop failures.

One seed can produce several flowering stems. Cross fertilization is assured by the female flowers developing before the male flowers on the same stalk emerge from the sheath. Pollination is by the wind. Early in September, the seeds ripen from the top down on heads fifteen to twenty-four inches long, and the harvest follows shortly after.

The freeze-up locks the rice plants in ice, and in spring, when the freshets raise the water level, the ice lifts and tears up the plants by the roots, the straw being cast up on the shore. Thus does Nature clear the rice beds of the old growth each year. In fact, the disturbance of the mud bottom by this wholesale tearing up of the roots is equivalent to cultivation and actually assists the germination of the seed.

The primitive Indian method of harvesting is still being practiced in Manitoba's rice beds. An Indian seated in the bow paddles or poles a canoe through the rice while a companion in the stern draws the plants over the canoe with a round stick, gently tapping the heads with a similar stick held in the other hand. He then repeats the process on the other side, thus drawing the plants alternately from right and left as they progress. The ripe seeds drop off into the canoe.

Since the seeds ripen over a period of about three weeks, the gathering is repeated at ten-day intervals from the same plants. Much of the seed is knocked off into the water and many heads are missed. Thus seeding is always ample for next year's crop, for it is doubtful whether more than fifty percent of the crop is gathered by the Indian method.

To speed up production, Howard Williams and the late W. Holliday developed a harvesting machine which resembled an invention of Superman himself. A Ford V-8 motor geared to paddle wheels on the sides is mounted on a flat-bottomed punt of shallow draft. The motor also furnishes power to operate two binder-like wings which slowly revolve as the boat progresses, drawing the rice heads over a trough into which are knocked the ripe seeds. Although ample seed falls into the water, Williams estimates that his homemade contraption is effective in harvesting from eighty-five to ninety percent of the crop. Like the Indians, he covers the same beds only three times during a season.

The Ojibwas in the North

still follow ancient hand-me-down methods of preparing wild rice for human consumption. It is sacked and carried to the parching fires, usually attended by old Indian women. Then it is dumped into sheet iron troughs resting on the fire and kept in motion by means of hoe-like utensils with long wooden handles. Parching requires from twenty to thirty minutes over a slow fire, and it is this process which loosens the hulls.

When parching is completed, the rice is transferred to the "dancing pots." These are clay or concrete containers into which half a bushel of parched rice is poured at one time. The pots are large enough for an Indian to stand in and shuffle about with his feet until the hulls are torn away from the kernels. This process is called "dancing the rice."

After this, Indian girls scoop the rice into birch bark trays and toss it into the air. In this way the loosened husks are separated from the rice by winnowing, the breeze carrying away the chaff.

After observing Indian processing methods for several years, Williams decided to mechanize the whole procedure. Since the Indians relied on the harvest as a source of income, Williams figured that if he could speed up the processing of rice, the natives could devote all their time to gathering the grain.

Located many miles from the nearest town, Williams decided to manufacture his own equipment, utilizing discarded metal oil drums. These he geared to gasoline motors, to be turned over open fires. Thus was the grain parched. Inside several drums he set wooden pegs, and when these were revolved slowly half-filled with rice, the same result was obtained as in dancing—and with less breakage to kernels. Further treatment consisted of passing the rice through a regular fanning mill where blowers removed chaff and dust, screening out broken kernels.

Seed intended for planting must be sacked as soon as it is gathered, and the sacks submerged in water. It is extremely important that the seed be kept continuously wet until time for shipment. If packed in two-ply burlap and expressed to its destination, the seed will stand a two-weeks' journey.

The best time to sow the seed in the middle and northern tier of states and in Canada is in spring after the northward migration of ducks is past. If sown in the fall, the loss from ducks is heavy, and again in the spring when seedlings have germinated.

Seed must be sown in shallow water that is not stagnant, preferably in water with a slight current. It is sown broadcast after being allowed to soak for twenty-

four hours. Good seed will sink to the bottom when dropped in a container of water; that which floats should be removed and thrown away. Seed that has dried out may not germinate the year it is planted, but if drying has not killed the germ, chances are that it will produce the following year.

In using his floating harvesting machine, Williams found that where the paddle wheel disturbed the mud bottom in open water, rice would grow in its wake the following year. By using the paddle wheel as a cultivator after the harvest, Williams has greatly extended the area covered by rice and improved the stand when areas were getting thin. The size and quality of seed have also been improved by this method of cultivation.

The Self-Sustaining Farmer

On an old Liverpool china milk pitcher of the "soft paste" period, which dates it prior to 1800, appears the following quaint inscription of anonymous authorship which describes the independent condition of the "Self-Sustaining" farmer of today no less happily than it did his predecessors of 150 years ago. The capitals are as they appear on the original inscription:

Let the wealthy and great
Roll in splendor and state
I envy them not; I declare it;
I eat my own Lamb,
My own Chickens and Ham,
I shear my own Fleece, and I
wear it;
I have Lawns, I have Bowers,
I have Fruits, I have Flowers,
The Lark is my morning alarmer;
So Jolly Boys now
Here's Godspeed the plough,
Long Life and success to the
Farmer.

On the reverse side of the faded old pink vessel one reads this Franklin admonition which present-day farmers would do well to heed, as did their wise old ancestors:

That by the plough would thrive
Himself
Must either hold or drive.

And the Currieresque decoration above it shows one farmer holding the plow by the handles while another drives the attached tandem team.

—W. I. Lincoln Adams, Hartford, Conn., in *New York Herald Tribune*

Success on Six Acres

Condensed from Market Growers Journal

Paul Work

ORDINARILY we hear a good deal more about the big vegetable operations which involve hundreds of acres than about the smaller ones. But even in California not all the growers are big-shots. Many a small grower who maintains a steady pace and packs and ships through good central plants is successful in the sense that he makes a comfortable living and shows a gradually increasing net worth at the end of each year. And of course in all areas there are small scale producers for local markets who are doing mighty well.

Joe Moiso, of Cumberland County, New Jersey, is a great gardener to visit. He started with his strong arm for capital, cleared his debts in four or five years and has improved his little place in both equipment and fertility every year since. His standing with his neighbors is witnessed in the fact that he is president of the Vineland Auction, of which he became a charter member in 1931. The Auction did a gross business in 1942 of $500,000, made a gross profit of $22,000 and a net profit of $9,200.

Joe Moiso came from Italy in 1920. After working in a factory for several years the urge to the land got him and he moved to the farm which he now owns. He farms just 5.8 acres of land, but he grows about 18 acres of crops. Moreover, he plants a cover crop on all of the ground every year, principally soybeans and crimson clover. He maintains fertility by using manure at the rate of about thirty-five tons per acre and this costs him money, for he pays $5.75 a ton at the railroad siding. He uses about six tons of fertilizer per year and a large quantity of poultry manure besides. He is in a great poultry producing section so he gets the chicken manure for about $1.50 a ton, plus hauling.

The cropping system is quite varied. At the time of the writer's visit in late April he had just cleaned up an acre of dandelions which were planted August 25 and for which he had realized a mighty good price through the Auction. His yield was around 700 bushels per acre. He grows both Boston and Iceberg lettuce. For the latter he uses the 847 and 44 strains and is quite sold

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on the new 456, which he tried out last year but was unable to get seed for this year. He grows one and one-quarter acres of carrots, one acre of beets, and three-quarters acre of White Queen bunching onions from seed. Nearly the whole place gets into snap beans in the course of a season, Bountiful and Streamliner being the principal varieties.

At the time of my visit, cabbage was just recovering from a severe freeze. The temperature went down to fourteen degrees Fahrenheit. The plants were damaged, but were not killed and showed every evidence that they would come on in good shape. Beets were killed, some damage was noticed on carrots and lettuce and parsley showed slight injury.

Mr. Moiso grows quite a planting of parsley each year. He sows thickly with rows twelve inches apart and uses thirty pounds per acre of seed. He cuts when it is about seven or eight inches high, taking it about one inch from the ground. A second growth comes up and is harvested and then the crop is plowed under.

The irrigation system uses C. W. Skinner nozzles and lines, a Myers, 6 x 6 pump, which is still giving fine service after 19 years. It is driven by an old Ford Model A engine. Water is from a drilled 4-inch well, 122 feet deep. He can water two acres at a time and puts on an inch in four hours. He has a 4-inch main down the center of the farm, with one and one-quarter inch risers and distributing lines of one and one-quarter and one inch.

Among other equipment are a home-built Ford A tractor, a Fordson '36 tractor, Bolens walking tractor, and Planet Jr. seeders and wheel hoes. All of the equipment is kept in fine shape. For example, after he was through with the manure spreader he turned the hose on it and gave it a good wash as one would a truck. The short time required to do this was probably a good investment. Mr. Moiso is partial to the Cole bean planter, which is not as widely known in the north as it might be. This company has specialized in cotton planters and makes a machine that gets a single seed at a place with a pretty fair degree of accuracy. Acme and Meeker harrows are used for finishing the land before planting. He reports that the Acme works when the soil is too sticky for a Meeker.

Mr. Moiso has his packages on hand for the season. New bushel baskets that cost $1.40 a dozen last fall are now $2.05. He figures that it pays to use new packages and this is not guess work, for he has observed consistent differences of 10 cents to 15 cents per package each trip. When questioned on this he said, "If you

don't believe it, go to Washington Street." That is good advice for almost any marketer, whether he is selling on Washington Street, New York, or Washington Street, San Francisco, or South Water in Chicago, or anywhere else.

As would be expected Joe Moiso sells most of his goods through the Vineland Auction. This auction operates twelve months of the year. In the winter buyers are mostly local, but in the summer they come from New York, Philadelphia, Wilkes-Barre, Newark and many other places. The heaviest products on the auctions are beets, carrots, lettuce, cucumbers, strawberries, beans and sweet potatoes. The market has done well throughout its history and has a substantial surplus on hand. The auditor congratulated them in his last report on their successful management. The auction charge is 3 cents to 4 cents a package. Patronage dividends have been paid at times, but usually, when conditions warranted, service charges have decreased and more recently they have had to be increased to meet rising costs.

Joe Moiso is both a worker and a thinker, and he follows situations closely all the while. For example, frequent tests of soil acidity are made and the soil is kept at about pH 6.6.

Mr. L. G. Cook, of the New Jersey Experiment Station, wrote an interesting story on "Joe Moiso, Soil Builder," in New Jersey Agriculture for October, 1942. Here is a paragraph from his story that gives a better picture than mere facts:

"On the back end of the Moiso farm there's still a piece of land left just the way it was when Joe bought it, so we went back to dig out a block of it to see what changes Joe and his wife have brought about since they've been there. We dug down about two feet in the place where the soil hadn't been farmed and cut out a "profile" we could bring home in a box. All the way down we found a hard reddish brown dirt. Then we went up in one of the irrigated sections and tried to take out another profile (in fact, we did take one out) but we had quite a job because the soil was so loose and fluffy that it would not hold together till we got it in the box. A full eighteen inches of rich black topsoil and all made from the other stuff by years of good management. Dr. Bear still has the two profiles up in the soils department if anyone wants proof."

New Crops for the New World

Condensed from Nation's Business

Charles Morrow Wilson

BEFORE Pearl Harbor, we imported from the Eastern Hemisphere about 94 per cent of our essential tropical commodities. But Japan changed that.

When, in only 120 days, the Japs seized more than 2,000,000 square miles of tropical and subtropical land in the Far Pacific, they got hold of some of the greatest agricultural reservoirs ever developed. They gained commanding control of the production of such things as natural rubber, quinine, hemp, valuable grass oils, etc.

Luckily for us, however, all these crops can be grown successfully in Latin America. The realization that we *must* have tropical products to win the war and to keep the peace—and the fact that these products can be raised in our own hemisphere — has resulted in the biggest and most beneficial shifting of crops in a century.

We are seeing the birth of an entirely new inter-American economy—an inter-dependence based, not on gestures and kind words, but on practical action and commerce. Here is a glimpse of what is taking place:

RUBBER: Although the hevea tree, main source of natural rubber, is native to Brazil, the British and Dutch Far East had an almost absolute world monopoly on natural rubber before Pearl Harbor.

Back in 1876, wild hevea seeds were taken from Brazil to London and germinated in Kew Gardens. The seedlings (less than 3,000) were exported to Calcutta, Singapore and other British outposts. From those seedlings grew the 9,000,000 acres of Far East rubber plantings which have yielded more than nine-tenths of all the rubber used since 1920.

Today, however, millions of seeds of selected, high-yielding strains of hevea are being planted in Central and South America. Within 12 years, the trees will produce from 1,200 to 1,900 pounds of crude rubber an acre as compared with less than 300 pounds of crude rubber an acre from the wild seeds which were taken out of Brazil in '76.

Hevea rubber can be grown successfully in 16 Latin American

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countries from Mexico to Bolivia. Henry Ford is producing hevea rubber at Bel Terra, Brazil; Goodyear at Cairo, Costa Rica. The United Fruit Company is planting more than a thousand acres of nursery farms in Costa Rica, Honduras, Panama and Colombia.

Whatever the developments may be in the manufacture of synthetic rubber, we will have available in the future plenty of natural rubber from the American tropics.

QUININE: The safest and surest defense known against malaria is quinine, made from the bark of the cinchona tree. Ninety-five per cent of the world's supply formerly was produced in the Netherlands Indies.

Although some new anti-malaria drugs are on the market today—atabrine and plasmochin—malaria is increasing and estimates are that, in addition to the new drugs, the United Nations will require at least 10,000,000 ounces of quinine a year.

It takes about ten years to bring a cinchona tree to maximum bearing, although some bark can be obtained in from three to four years after planting. Several years ago, Philippine scientists developed a comparatively rough bark extract called "totaquine" (poor man's quinine) which can be made from the bark of wild trees.

High-yielding, cultivated cinchona trees are now being established in Latin America. Guatemala, with an estimated resource of 1,600,000 cinchona trees planted in 1878, is the pace-setter. Seeds from the Guatemala trees are being widely planted by the Colombian Government.

In March, 1943, Costa Rica signed an agreement with the United States to provide 10,000 acres to be planted to cinchona trees under the direction of the United States Department of Agriculture, the whole project to be turned back to Costa Rica in 25 years.

Our Department of Agriculture has recently sent high-yielding cinchona seedlings to Sao Paulo, Brazil; and has assigned foresters to locate wild cinchonas in Colombia, Ecuador, Peru, Bolivia, and other South American countries.

HEMP: Manila hemp is used for making water-resistant, salt-resistant, shock-absorbing rope. Hemp comes from the stem of a banana-like tropical plant called abacá, formerly grown in the Netherlands Indies and the Philippines.

A navy or merchant marine without plenty of the right kind of rope is crippled. But abacá grows well in Latin America and is quick-maturing. It reaches harvest age about 18 months after planting.

When the Japs swept over the tropical East, our American tropics lacked planting stock of abacá. In about 1925, however, the Department of Agriculture had brought some abacá roots from the Philippines and had planted them in Panama as an experiment. The United Fruit Company later expanded this seed farm to about 2,100 acres. This became the principal source of abacá seed for the Western Hemisphere.

Early in 1942, the Defense Supplies Corporation bought the seed plantation and contracted with the United Fruit Company to plant 20,000 acres of abacá in Central America for urgent war use. At least 125,000 acres of abacá in the American tropics are needed, and planting is now under way.

Grass Oils: Before the war, the Netherlands Indies had a monopoly on valuable grass oils, such as vetiver, the base of many perfumes; and citronella oil and lemon oil, used in making menthol, soap, pharmaceuticals and insect sprays.

The work of Dr. V. C. Dunlap, a Cornell plant pathologist associated with a Honduran farming company, provides a significant example of how new crops are expanding in the New World. On March 1, 1941, Dr. Dunlap set out 65 heads of citronella grass. By June, the number of plants had grown to 596. By the beginning of 1942, he had more than an acre of the grass. In six months, this had increased to 50 acres—and by the end of 1942, it had climbed to about 250 acres.

By the end of 1943, it will probably be at least 8,000 acres—enough to establish citronella as a stable crop for Central America. Lemon grass also is now being grown in Guatemala. The various oil grasses can be harvested three or four times a year, with oil recovery ranging from 90 to 250 pounds an acre for each harvest.

Rotenone: Rotenone is an insecticide base which has the peculiar property of being toxic to insects and other cold-blooded creatures but not to warm-blooded animals. Thus rotenone destroys enemy insects without impairing the edibility of green vegetables or fresh fruits. Tons of it are used also for ridding livestock of flees, lice and parasites.

Best source of rotenone is the root of the derris plant, a tropical perennial which comes into bearing from 18 to 24 months after seeding. Formerly, Malaya and Java grew most of the world's supply.

When the war broke out, the Department of Agriculture acted quickly to step up the production of rotenone in our own hemispheres. Root cuttings of derris were flown from the experimental station at Puerto Rico to Haiti,

Guatemala, Honduras, Ecuador, Brazil and other countries in the American tropics.

Substantial quantities of derris root will be harvested this year; and after this year, it is likely that millions of pounds of the rotenone will be supplied from derris root raised on this hemisphere.

Here again the superiority of the soils and climate of the American tropics is being demonstrated. The highest recorded yield of derris root in the Netherlands Indies is about 2,000 pounds an acre. In Puerto Rico and Ecuador, experimental yields are about 3,000 pounds per acre.

OTHER CROPS: Roselle, an important jute substitute used extensively in bagging and cordage, is being planted for the first time in Costa Rica, Honduras and Guatemala by the United Fruit Company on order of the Defense Supplies Corporation.

Staple spices, such as vanilla, ginger, allspice, black pepper, and nutmeg, are being re-established in the American tropics on a commercial basis.

In the past, we have always imported cork, principally from Spain, Portugal and North Africa. Except from North Africa, which normally produces about 20 per cent of our cork, we are now pretty well cut off from established sources of supply.

Our Department of Agriculture has been growing cork trees in experimental stations in California. Acorns from these trees are being planted in Puerto Rico, Haiti, Honduras and other dryland areas south of the Rio Grande. Although it takes from 20 to 25 years for a cork tree to reach a marketable age, our cork will be harvested eventually in our own south doorway.

Heretofore, all our teak wood has come from the eastern tropics. But in Honduras, the United Fruit Company is making experimental plantings of teak, as well as of rosewood and tropical cedars which formerly were imported from the war-blocked Far East.

Some Studies of Pastures for Sheep . . .

Condensed from The Sheepman

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and
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LIVESTOCK men usually rely upon observation in judging the value and planning the use of a pasture. Any green and succulent crop has been considered by many to be good pasture regardless of the kind of animals, their stage of maturity, or the ultimate products the pasture was expected to produce. Only too frequently animals may be shifted from one pasture to another irrespective of their condition because the one pasture looked poor and the other looked good.

Because of the reputation that a rotation scheme of grazing has attained in Europe, it has been assumed by pasture technicians and others that this system of management was widely applicable in the United States possibly with not enough consideration for the growth habits of the kinds of plants being grazed.

In order to compare rotation with continuous grazing of ewes and lambs on alfalfa-brome grass pasture, 11 acres of this mixture, each acre individualy fenced, were seeded in August, 1939, at the W. K. Kellogg Farm, one of the branch experiment stations in Michigan. That station is located in Kalamazoo County, and the soil type is largely Bellefontaine sandy loam. Before seeding the mixture of eight pounds of alfalfa and seven pounds of brome grass, the soil was limed with two tons of ground limestone and treated with 400 pounds per acre of 0-20-20 fertilizer. Good stands were secured in all 11 paddocks. In order to give these new seedlings a fair start, pasturing was delayed until June 7, 1940.

Four of the 11 paddocks were set aside to be used in a rotation scheme of management and four separate acres were set up to be used for continuous grazing. On the remaining three acres, the first crop was cut for hay June 12, 1940, and the second crop was pastured. In another area, two duplicate acres each of alfalfa-brome, ladino and brome brass, and birdsfoot trefoil and

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brome grass were seeded in August, 1939. The soil and soil treatments on these plots were the same as for the 11 acres previously described. The first crop on these plots was cut early for hay and the second was used to test the value of these mixtures as a weaning and fattening pasture for lambs. The sheep used were principally Shropshires.

On June 7, 22 ewes with 27 lambs and 10 yearlings were turned into plot one of the rotation and six ewes with lambs plus two yearlings were turned onto each of the four acres set aside for continuous grazing. The sheep were weighed and moved at weekly intervals on the rotation plots. The sheep on the continuous grazing areas were weighed in general every two weeks. The yearling ewes were removed on July 12, the ewes being left on these pastures until August 30. The lambs were removed and transferred, at weaning time beginning on July 12, to the previously-mentioned plots of alfalfa-brome and ladino-brome. The birdsfoot-trefoil-brome mixture did not make sufficient growth and the stand and vigor of the birdsfoot trefoil was so poor that these plots were left out of the test.

In some experiments dealing with rotation grazing, livestock gains have been credited to each individual field in the rotation in an attempt to evaluate different pasture crops or treatments used on the different areas. This procedure involves a fallacy in comparing the different pastures because of differences in the time of grazing, stage of maturity of the forage and of the animals, weather conditions, etc. This fallacy became evident when the ewes and lambs on the regular rotationally grazed alfalfa-brome grass were weighed at the time of being moved from one paddock to another and gains credited to each in turn. After the first rotation cycle had been completed and two of the four areas in the second cycle, the sheep were weighed at regular intervals without regard to individual plots.

On September 13, the lambs which had been weaned on July 19 and August 2 from the rotation and continuous grazing plots averaged 79 pounds. The lambs were graded at this time and all were graded as No. 1 and those sold brought top market price. The lambs reached market weight and condition for their breed, on pasture, fully a month sooner than lambs of similar age had ever been marketed before off this farm.

Because the pastures for 1940 came from a seeding made in August, 1939, it was thought that there might be a wider difference in results between the two systems of grazing if the sheep were

turned on earlier the next spring in consideration of the expected increase in productivity of forage during the second year.

During the grazing season of 1941, the same practices and same areas were used as in 1940 except that the three acres previously cut for first-crop hay and second-crop pasture were put into a three-plot rotation scheme. Starting on May 16, three weeks earlier than in 1940, the pastures were stocked somewhat lighter, with five ewes and their lambs per acre.

The sheep on the rotation plots were moved regardless of weighing date and whenever the forage left was considered unpalatable to the animals. In most cases, considerable stemmy material remained which the sheep would not eat. After grazing, the areas were clipped high with the cutter bar raised.

In terms of total gains per acre there was relatively little difference in the three management schemes. However, certain differences are in evidence when considering the gains made by the lambs previous to weaning time. At the end of the first eight weeks of grazing, the lambs had gained 205 pounds per acre on continuous grazing, 148 pounds per acre on the three-field rotation, and 137 pounds per acre on the four-field rotation. Two weeks later, on July 11, the differences were not so apparent, being 209, 178, and 172 pounds per acre, respectively, for the three practices. On this date also, 26 of the 28 lambs from the four acres of continuous grazing were weaned, having reached the necessary weight and condition, whereas nine out of 20 were weaned on the three-field rotation and only 10 out of 27 from the four-field rotation group.

With respect to the ewes on the different treatments, those on continuous grazing lost the most weight, 28.5 per acre, over the season, whereas on the four-field rotation the ewes gained an average of 2.5 pounds per acre and those on the three-field rotation gained 26.6 pounds per acre.

From the livestock viewpoint, it would be nearly ideal if the lambs could be brought to market weight at weaning time. This practice in Michigan would allow for a balancing of the livestock to the pasture at a time when the forage production was declining due to lack of rainfall and hot weather. Likewise, as the forage matured or dried up, it would still make a good maintenance feed for mature animals, even though poor for milk or growth production.

In the pastures under rotation grazing all of the forage in a given area tended to be of the same stage of maturity which was not true in the case of the areas

which were continuously grazed. In the areas continuously grazed, so long as quantity of feed was sufficient, there was apparently a selection offered the animals as to forage maturity which might balance the ration to the needs of the ewes and lambs at various stages of their growth.

There was no apparent advantage to pasturing a second crop of the mixture over that of continuous grazing provided the continuous-grazing area had not been overstocked resulting in insufficient feed during the latter part of the season.

The weaning of lambs from the middle of July to the first of August made it possible to put them on a better fattening pasture and at the same time to limit the load on the continuously grazed area during the period of slow forage growth.

It was possible to fatten lambs on good pasture without supplementary grain feeding. The lambs in this test were ready for marketing from three weeks to a month earlier than had been possible with comparable lambs on supplementary feeding in previous years.

How Much Gasoline?

Of course there is no set way to figure how much gasoline will be used by a particular tractor on a particular job. Much depends on the gasoline itself and the condition of the engine. But State Agricultural Engineer E. R. Gross has worked out a consumption table that should prove handy when talking with your local rationing board.

Operation	Gals. Gasoline Per Acre
Plowing	2.5 to 4.0
Row crop cultivating	.75 to 1.25
Discing	1.0 to 2.0
Harrowing	.75 to 1.25
Grain binder	.75 to 1.25
Combining	2.5 to 3.5
Grain drill	1.5 to 2.0
Corn planter	1.25 to 2.0
Potato planter	2.0 to 3.0
Hay loader	1.5 to 2.0

Gross points out that farmers cannot operate under ideal conditions. They have to take things, conditions, and help as they can get them. They have to get the job done. Under these circumstances the farmer's tractor will generally burn up far more gasoline than some theorist thinks it should. In figuring requirements, therefore, the higher amounts shown in the table are the safer, unless actual operation tests of a particular tractor in question show otherwise.

Better Seed or Better Soil

Condensed from Soil Conservation

W. A. Albrecht

Chairman of the Department of Soils, University of Missouri

THE size of the harvest is the measure of the productive capacity of the soil. Such capacity can be no larger than that permitted by the soil fertility. But harvest time is already too late to help the yield of that crop, revealing the deficiencies that were a handicap during its growth, or even in the earlier process of germination. That shortages in soil fertility or in plant nutrients in the soil—particularly of lime or calcium — should show up in the very beginning of the plant's life, and should be responsible for poor germination and defective stand even in grass crops is not widely appreciated.

Grass seedings may be costly through wastage of seed and loss of stand, according to some work by Dr. E. R. Graham at the College of Agriculture of the University of Missouri. By using three different lots of soil that had been carefully prepared to deliver three different amounts of calcium or lime, he demonstrated a heavier stand of bluegrass from the same rate of seeding as the soil supplied the embryo plants with more life.

These soils, in all three parts, had been provided with the same amount of all fertility needs other than lime when they had first been planted to soybeans. The entire bean crop, roots and tops, had been analyzed. In this way the lime delivery from soil to crop was measured. Pan No. 1 supplied 16 units of lime to the soybeans; pan No. 2 provided them with 42; and the third pan with 112. These figures represent the lime this legume obtained from these soils to make the differences in growth.

We have commonly blamed the lime shortage in the soil, or soil sourness, for poor stands of legumes. We have been liming to keep from wasting costly legume seeds. When 8 pounds of clover seed, at $9 a bushel, are thrown away in stand failure, to mean the loss of $1.20 per acre, we do not appreciate the fact that this would need to occur but twice to pay for liming that failing acre with almost 2 tons of limestone. It need occur only once to cover

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the cost of drilling about a half-ton of limestone per acre as one drills fertilizers. Lime put into the soil in late winter in this manner can do much to supply the calcium needed to improve germination, to thicken the common stand, and to get the crop off to a good start. Grasses, as well as legumes, are now demonstrating the same possibility.

Perhaps we shall eventually believe that liming the soil is more a matter of giving the crop its calcium than one of fighting soil acidity. When we do, we shall not only use the limestone broadcast in heavy dosage to cover our neglect of the soil during the past, but we shall drill limestone regularly to meet the recurring needs, as we do any other fertilizer.

Bluegrass seedings are already here with their sad tales of stand failures. When these more numerous crop failures with reduced seed production shove seed prices up, as clover failures have done, then we will either lime the soil, or search for a substitute crop for bluegrass. By that time, however, we may have enough knowledge about the chemical composition of the crop, and enough appreciation of its variable value as animal feed, in terms of variable soil fertility producing it, that we will not accept the crop substitute, but will treat the soil instead.

Dr. Graham's demonstration that a stand of bluegrass is in proportion to the lime delivery by the soil, in spite of the fact that all other nutrients were amply supplied, suggests that lime is the foundation on which to base the help by other fertilizers. He has called attention forcefully to the fact that if we are to use our investment in fertilizers and seed for good returns on soils like many of those in Missouri, we must make certain that these soils first have, and can deliver, the calcium needed by the crop. How much seed can be saved, and how much more profitable the use of fertilizers can be when the lime needs of the soil are supplied may be one of the revelations of the future. At present such attention to soil bids fair to result in (*a*) stand improvement even in bluegrass, (*b*) tonnage increase in forage harvest, and (*c*) greater feeding value of crops that must be garnished through the help of animal machinery and converted into cash via the milk pail or the butcher block.

Wartime Swine Feeding

Condensed from Hog Breeder

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THE increases in numbers of hogs raised by farmers in this country during the past two years, paralleled by increases in poultry and, to a less extent, in numbers of milk cows, necessitate some radical changes in feeding practices. All of these classes of animals are heavy users of concentrate feeds. The tonnage increase in feed requirements is far greater for hogs than for any other class of livestock.

In 1940 the hog crop was in the neighborhood of 80 million head; in 1942 the estimates show that it exceeded 100 million; and in 1943 the crop is expected to reach 120 million. This represents an increase of 50 per cent over the pre-war level. Thus far the supply of feed grains has appeared to be adequate. Supplies of mill feeds also appear to be ample. The experiences of farmers since the summer of 1942 have shown that supplies of protein concentrates are not so adequate. Actually, production of these concentrates has increased, on the whole, at a rate about equal to the increase in numbers of animal units. Hog and poultry raisers in recent months, however, have experienced more difficulty than other producers because poultry and hogs are heavy users of protein concentrates in relation to cattle, sheep, and other classes of livestock.

So far as protein feeds for hogs are concerned, the crux of the situation relates to the supply of animal proteins such as tankage, meat meal, fish meal, and milk byproducts versus that of vegetable proteins, particularly soybean meal. With fish meal production greatly reduced and that available reserved mainly for poultry, together with a lack of sufficient increase in supplies of tankage and meat scrap, the net result is a decrease in animal protein concentrates available for hogs, amounting to perhaps 30 per cent. On the other hand, the supply of vegetable proteins actually or expected to be available and which must be used for feeding hogs, has at least trebled. Supplies of skim milk fed on the farm to hogs have not changed appreciably.

Reprinted by permission from the Hog Breeder, Chicago, Ill., August, 1943

The change in type of protein concentrates which must be fed under such conditions can be summed up by comparison of ratios. In 1940 there was close to one ton of tankage or other animal protein feed for each ton of vegetable protein feed such as soybean, peanut, cottonseed, linseed, and other comparable oil meals. This year there promises to be only one ton of the animal protein concentrate to 5 or 6 tons of the vegetable proteins. Expressed in another way, the trinity mixture for hogs, of former years, in which 50 parts was tankage or fish meal with the other 50 parts divided between vegetable protein feeds such as linseed meal and ground legume meal, no longer expresses the average available supplies. Instead, the animal protein needs to be reduced to perhaps 12 parts and the vegetable protein increased to 65 or 70 parts. To complete the picture on a country-wide basis, the use of approximately 10 parts each of millfeed and alfalfa or other legume meal, as required to give 100 parts in the protein mixture, about represents the supplies which are expected to be available for feeding hogs.

The liberal use of barley, oats, rye and wheat to replace a part of the corn is recommended because of the increase in protein provided by these grains. Furthermore, increased emphasis must be placed on the value and need for using all the skim milk, buttermilk and whey available either on the farm or at the creamery or cheese factory which can be allowed to the pigs and to older breeding stock. Pastures are another means of reducing the needs of purchased protein feeds and for tiding the herd through periods of shortages.

In using purchased protein feeds, it will be highly advisable to mix the animal and vegetable protein concentrates in order that the animal protein supplies can be stretched as far as possible and do the maximum good. These animal proteins are needed mostly by weanling pigs, followed in order by pregnant and nursing sows, other breeding stock, and finally by fattening shoats. Accordingly, mixtures need to be adjusted to allow somewhat higher proportions of animal protein for weanling pigs and sows and lower proportions for fattening hogs. It is not necessary or economical to use tankage, meat scrap, or fish meal as the exclusive protein supplement even to weanling pigs. Commercial feed mixers have adopted a self-rationing program to conserve the animal protein supply as it applies to such feeds. It is recommended that farmers who wish to buy their protein concentrates in straight forms, adopt practices whereby they do not use unduly

large proportions of tankage or other commercial animal proteins to the detriment of their neighbors.

FEEDS SUITABLE FOR SWINE

Carbohydrate-rich Feeds: This group consists first of the cereal grains, mainly corn. As already indicated, the use of barley, oats, wheat, and rye which contain about 30 per cent more protein than corn, will help to reduce the quantity of protein concentrates needed in the ration. Other cereal and grain products which can be used as a part of the diet include emmer, spelt, rough rice, brewers' rice, rice polish, rice bran, oat mill-feed, hominy feed, millet seed, buckwheat, and molasses. As a group, all of these feeds are low in carotene, except yellow corn, and in calcium. The phosphorus content ranks fair in the whole grains and moderately high in some of the mill products such as rice polish and rice bran.

Protein Supplements: The animal and marine products which need to be used on a reduced basis include tankages, meat scrap, meat meals, fish meals of various types, blood meal, and liver meal. Besides the liquid skim milk, buttermilk, and whey available to the hog feeder, the semi-solid or dried milk products may also be used. The four plant-source protein meals which have received most attention in recent months are soybean, linseed, peanut and cottonseed. Wheat middlings, wheat shorts, and wheat red dog flour, although only a few per cent higher in protein than whole wheat, have long been used by hog feeders. These feeds help to reduce the amount of high-protein concentrates needed in the ration for best results and besides have other properties to commend their use. Other products which should be mentioned are corn-germ meal, corn-oil meal, and distillers' dried grains with solubles. The last-named feed and variations of it which are high in solubles promise to become available in increasing quantities through the reclaiming of the distillery slop from the manufacture of alcohol for war purposes. Still other feeds which may be available in some areas and are useful in varying degrees as protein savers are rye middlings, rye feed, barley feed, buckwheat middlings, field peas, pea feed, cowpeas, cull beans (cooked), coconut-oil meal, sesame-oil meal, sunflower-seed-oil meal, dried yeast, bakery waste, palmo middlings, and garbage.

Forage Crops: The list of forage crops useful for pasture or grazing of hogs includes alfalfa, clover, rape, field peas, soybeans, cowpeas, velvet beans, oats, rye, wheat, bluegrass, sudan grass, and the sorghums. To this list may be added the root crops such as potatoes, sweet potatoes, man-

gels, beets, and peanuts. If soft or oily pork is to be avoided or kept from being too objectionable the peanuts should be grazed by breeding stock and feeder pigs but not by fattening shoats.

Where dried forages must be used either in winter or in dry-lot feeding, a variety of legumes can be utilized by hogs as hay. When ground, these hay meals may be used in the mixed diet or in the protein supplement. Alfalfa, clover, soybean, lespedeza, field peas, and kudzu are all satisfactory.

Methods of Feeding

The urgent need for pork requires intelligent utilization of present supplies of feed to protect the hogs' health and to promote growth. The primary object in pork production is to keep animals gaining at their maximum rate from birth to a finished market weight.

A careful survey of facilities for hog raising should be made and plans adopted to stagger the farrowing so as to utilize the hog-lot equipment to its capacity without overcrowding. Feed supplies should be planned accordingly. Good management practices and an effective sanitation program should be followed, otherwise good feed may be wasted in pigs that drop out along the way.

The self-feeder is a common method employed to produce pork quickly and with a minimum of labor. The best way to regulate the proportions of constituents of the diet is to mix the grain, protein, and mineral constituents and self-feed this mixture. There are times, however, when the three materials may be placed in separate compartments of the self-feeder and the hog allowed to choose the proportion of each feed according to its appetite. This does not mean, however, that daily attention is not required on the part of the farmer. The self-feeder should be checked at least twice daily to see that it is working properly and that feed is available. It is especially important when the self-feeder is used that a good supply of clean, fresh drinking water be available at all times. Hogs require plenty of water to utilize their feed efficiently.

Where hand feeding is practiced the plan of increasing the number of feedings daily usually produces faster gains. The time of feeding, intervals between feedings, and regularity from day to day are important. A hog with a comfortably full stomach is more content than one that is uncomfortably full at one time and hungry at another time.

For best results it is important to have the pigs sorted into lots of approximately the same age and weight basis. The handling of pigs of different size in the same lot is poor management, as

the larger pigs may crowd the smaller one away from the feed and retard their growth and development.

There may be times during the production cycle when it becomes necessary to limit the amount of daily feed until a new crop becomes available. When necessary to reduce the total quantity of feed given daily it is very important that the quality of the ration be maintained, or even improved, so that the hog can be kept in a good state of health and ready to make a rapid finish later when ample feed is again available, or when crops may be hogged down in the field.

No one of the above methods can be recommended to suit all conditions. It is the duty of the individual feeder to determine which method or combination of methods will give him most efficient production in the least time under his particular farm program.

Farmers who have skim milk available on the farm or who can obtain buttermilk or whey are especially fortunate since these by-products can greatly reduce or even eliminate the need for purchased protein, mineral and vitamin-rich feeds. The high quality of the proteins in skim milk and buttermilk, especially as supplements to the grains, make it possible actually to use less total protein in the milk-grain ration than in the combination rations of vegetable meals, tankage, and grains described above. With skim milk or buttermilk available, there is correspondingly less need for the incorporation of tankage, meat scrap or fish meal into the diet.

If 3 to 4 pounds of skim milk a day are fed to pregnant sows and gilts, and to pigs from the suckling period through the fattening period, and 8 pounds to lactating sows, the percentages of protein - mineral mixtures can be cut in half and the corn correspondingly increased. Furthermore, only certain mixtures need to be used in dry-lot and others in pasture feeding. It follows that doubling the allowance of skim milk to 6 to 8 pounds and to 16 pounds (1 and 2 gallons) will permit the entire elimination of other protein supplements and of calcium and phosphorus supplements as well. Undoubtedly the partial substitution of skim milk for other protein supplements is to be preferred because it permits the combining of animal and vegetable proteins in highly efficient mixtures.

Whey is generally considered worth about one-half as much as skim milk for growing pigs. The protein content is less than one-third that of skim milk but is of excellent quality. In general, it is not advisable to depend on whey as the sole supplement to corn.

How to Apply Fertilizer for Best Results

Condensed from The Fertilizer Review

EVERY fertilizer user is faced with the problem of how to apply fertilizer to his crops so that, in normal times, the largest returns will be obtained for each dollar spent. In wartime the farmer is still concerned with getting the most from his fertilizer dollar, but there is the added incentive of getting the most food and raw material from each pound of plantfood that goes into the soil.

For many years agricultural scientists, under the leadership of the National Joint Committee on Fertilizer Application, have been trying to find the best methods of applying fertilizers to crops in all sections of the country and under a great variety of conditions. Much progress has been made, and in many cases methods have been developed and put into practice that are far superior to the methods previously used.

Most of the fertilizer used in this country is applied with some sort of machine, either before planting, or at the time of planting, or during the early part of the growing season. Therefore, the method af application employed by the individual farmer depends very largely upon the machinery which he has on his farm. The machines used for applying fertilizer have been improved greatly in recent years, but many of the older machines still in use are inefficient in so far as the application of fertilizer is concerned. Fortunately, many of these older machines can be improved by purchasing attachments that are relatively inexpensive.

For the crops that are grown in rows and cultivated, like corn, cotton, potatoes, tobacco, and many of the vegetable crops, best results are obtained when the fertilizer is applied in bands at the sides of the rows, usually at the time of planting. This fact has been emphasized by the results of hundreds of experiments, and tests that have been conducted since 1929, in practically all sections of the country.

In the case of small grain crops, the combination fertilizer-grain drills, which have been on the market for many years and which apply the fertilizer in direct contact with the seed, are quite satisfactory. This might seem to be a contradiction of the statement made above with respect to row crops, but the small grain crops are drilled in seven or eight inch rows and the amount of fertilizer

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applied in each row is very small. In fact, experiments have shown that it is more effective to drill the fertilizer with the seed for these crops than to apply it broadcast and harrow it into the soil prior to seeding.

For cotton most of the fertilizer is still applied with one row distributers and bedded on prior to planting. When the seed is drilled, it is usually two or three inches above the fertilizer, and the injury to the stand is not serious. Even so, side application has given distinctly better results in many trials and many combination fertilizer planters, both horse-drawn and tractor-drawn, have been sold in the cotton belt during the past few years. There is great need for a one-row machine for use in planting and fertilizing cotton, and such a machine, recently patented by Collins and Giles of the North Carolina Experiment Station, may be the answer. A number of these machines have been manufactured, and will be given a thorough trial this season.

For many years agronomists have felt the need for better methods of fertilizing corn. In the North the usual practice has been to apply a small amount, either of complete, or, of a phosphate-potash fertilizer in the row with the planter, the amounts ranging from less than 100 pounds up to 200 or 300 pounds per acre. These light applications have, in general, been profitable, whereas heavier applications applied broadcast, and worked into the surface soils, have not been very satisfactory. In 1936 an experiment involving the plowing under of heavy applications, in addition to normal applications applied in the row, were started in Indiana and since then many similar experiments have been carried on in the Middle Western and Eastern States, not only with corn but with soybeans, tomatoes, and other crops.

These experiments can scarcely be considered conclusive as yet, but there are strong indications that the plowing under of rather heavy applications of fertilizer may be very profitable under some conditions — not only for corn but for other row crops. However, the row application will still be needed to get the crop started and to develop roots that can reach the fertilizer that was plowed under. Fertilizers that are broadcast after plowing and harrowed in are mixed with only two or three inches of the surface soil. Usually the soil is fairly moist at planting time and fertilizer applied on the surface produces a luxuriant weed growth, making cultivation difficult. Later on the surface soil dries out and the plantfood is unavailable to the crop. When fertilizer is applied at plow depth it is nearly

always in moist soil and the plantfood goes into solution as needed. Moreover, the phosphate and the potash are less likely to be changed into unavailable forms than when they are mixed more thoroughly with the soil.

A few experimental plow attachments were tried out last season, and the results were so encouraging that a larger number will be in use this season although this attachment is not as yet on the general market. Farmers who desire to try plowing fertilizer under can apply it broadcast on the surface before plowing, although this is probably not as effective as putting it right in the bottom of the furrow.

Where it has been the custom to use heavy applications in the row, it may be found desirable to plow under a part of the application, and to make a lighter application in the row. For example, many potato growers in the Eastern States use 1,500 to 2,500 pounds of fertilizer per acre. Such farmers may want to try plowing under 1,000 to 1,500 pounds, applying only 500 to 1,000 pounds in each row. In addition to other possible benefits, there would be much saving of labor in filling the fertilizer hoppers at planting time.

Where relatively light applications of complete fertilizer containing only 2 or 3 percent of nitrogen have been made in the row for corn, poor results have been obtained in many cases due to lack of nitrogen. The fertilizer gives the crop a good start, but it runs out of nitrogen in the middle of the season. For this reason, light row applications pay best when the soil is at a relatively high fertility level. In other words, more bushels can be expected from a light application in the row on a soil that will yield 60 bushels of corn without fertilizer than on a soil that will yield only 30 bushels without fertilizer, or on a well-manured soil as compared to one that has not received manure, or where corn follows clover as compared to corn following timothy. On a poor soil the fertilizer that is plowed under should contain a high percentage of nitrogen, whereas on a fertile soil it may pay to plow under a heavy application of phosphate and potash fertilizer.

When the war is over it is expected that nitrogen will be somewhat lower priced than it is now, and that the supply available for agricultural use will be abundant. It would seem that the plowing under of relatively heavy applications of high-nitrogen fertilizer may offer one of the best methods of utilizing this nitrogen efficiently.—H. R. S.

Use of Soil Moisture for Big Crop Yields

Condensed from California Cultivator

R. E. Stephenson

AN average of about 500 tons of water is required to produce one ton of dry hay. Four tons of alfalfa hay an acre may draw from the soil 2000 tons of moisture which represents about 18 inches of rainfall, or the useful moisture stored in nine or 10 feet of soil.

Summer crops must be produced mostly with winter rains stored in the soil, unless irrigation can be practiced. Good soil will hold two inches of crop water for each foot in effective depth or root zone. Summer crops may send roots down four to six feet into such soil. Therefore, summer crops have access through their root systems to the equivalent of eight to 12 inches of water for growth. This quantity of water is sufficient to produce probably two tons of dried crop. Very large yields are possible only through the use of supplemental irrigation during the growing season.

The first step in conservation of the limited supply of available moisture is early preparation of the land. The few inches of surface soil may dry between showers, but the deep soil loses very little of its stored moisture except when plants with deep roots suck the water from the soil down to the wilting point; which can happen very quickly in drying weather. Weeds, cover crops or any growth which remains after the rainy season, will probably remove water that will be seriously needed and cannot be replaced for the summer crop. Early weed control is necessary even though the summer crop may not be seeded until June or later. Getting rid of the extraneous growth keeps the soil full of stored moisture until the desired crop can use it.

The soil that is producing a cultivated crop should not be allowed to form a surface crust, but only tillage sufficient to break the crust is needed. Deep tillage which destroys surface feeding roots may do much damage. With a well developed and undisturbed surface root system, most of the moisture in the surface soil may be absorbed by the crop and direct loss of water by evaporation is reduced to the minimum. When the surface feeding roots

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are destroyed by deep tillage, the crop loses its capacity to absorb both nutrient and moisture, and yields are cut in proportion to the severity of the root pruning. Deep tillage does not draw moisture from the deep soil for crop use. Roots must go to the moisture in the soil and, to have the most moisture for the crop, the root system must not be disturbed. Soil water effectively conserved and utilized, may be the determining factor in the final crop yield.

A cover crop or the natural vegetative growth, should never be allowed to stand too long. Rank-growing alfalfa has been known to use in three days of dry hot weather, one-fourth of all the water required for the entire crop. If this alfalfa land had been plowed after that period, the soil would have been dry and the next crop would have suffered for lack of water unless there was additional rainfall or irrigation.

Temperature and humidity of the atmosphere have important effects upon the use of water by plants. Air which may be saturated at 70 degrees F. will be only 40 per cent saturated if warmed to 100 degrees and will have a correspondingly greater pull toward increasing transpiration. When 80-degree air is warmed to 90 the increase in moisture-holding capacity is 20 times as great as when air 10 degrees below zero is warmed to zero. When humidity is low, warm air will greatly increase evaporation from plants and soils. That is why very hot, dry air may burn the foliage from trees, even though irrigation water is supplied. Under those conditions, water evaporates from the leaves either faster than the roots can absorb it or than the transporting system of the tree can move enough to meet the needs, or both.

Shallow soils are poor, partly because of a lack of storage depth for moisture. Even when irrigated they are at a disadvantage because they discourage the development of sufficient plant roots to permit adequate moisture absorption.

Where irrigation water is not available, thinner planting is necessary in order to economize moisture. Half as many plants may obtain sufficient moisture for satisfactory growth where a full stand would exhaust the limited supply of water, and crop failure would result. Available moisture is more abundant in the early season before the soil has dried and, during that period, transpiration is less rapid. Early varieties and early planting (but not before the weather is sufficiently warm) aid in the effective use of this supply of moisture.

A surface soil mulch which need not be deep, saves moisture. Small clods make a more effective mulch than dust which may settle sufficiently to re-establish capillarity. Litter, compost, grass clippings, straw or similar materials, make an effective mulch for water conservation. These materials, placed around the plants while the soil is moist, save the moisture of the topsoil which supplies most of the plant nutrients. The mulch in no way interferes with irrigation which may be applied through or under the material.

Water is most easily removed by the plant when the soil is near its maximum capillary capacity and is also well aerated. As the soil moisture is reduced by plant growth, absorption is slower and stresses set up within the plant cause the growth rate to slow down. When available moisture is reduced until the plant is near the wilting point, growth practically stops, particularly in hot weather accompanied by low humidity. In moist air the plant would probably continue to grow. The expression "a west wind is as good as a rain" had its origin in areas where a moist atmosphere associated with winds from that direction, reduced transpiration sufficiently to permit growth on a limited supply of moisture.

Overwatering is dangerous in hot weather. Plants need air or available oxygen for the root system as much as they need water. The hotter the weather the greater the need for good aeration. A waterlogged soil is not aerated and is disastrous during a hot spell. Standing water in an irrigated field stops growth until the excess water drains away. Loose, open soils drain quickly and are well suited for irrigation practice. Frequent light irrigations that quickly wet the root zone are easily made. There is then sufficient of both available water and oxygen for satisfactory plant growth. The irrigator should understand and observe these fundamentals of plant growth because they definitely affect irrigation practices.

The South Is Growing Cork Trees

Condensed from The Southern Planter

Giles B. Cook

CORK oak trees will be planted in large numbers from Maryland to Texas during the coming fall and winter. For almost a century cork oak trees have been growing in the Southern States, proving that this section of the United States has the proper climate and soil for cork trees. In 1924 more than 1,600 young cork seedlings were distributed throughout the South for experimental planting. Eighty per cent of these young trees have survived and within the next 12 months more than 100,000 cork oak seedlings will be planted in the Southern States.

Cork is one of the critical materials essential to our war effort and whose use is controlled by the War Production Board. It is a vital raw commodity and our requirements must come from 3,000 miles away, across the submarine infested waters of the Atlantic. Due to the neutrality of Spain and Portugal a limited supply of cork has been brought to the United States since September, 1939. The liberation of Algeria by General Eisenhower has eased slightly the four years of shortage, but the quantity of cork reaching the United States is still far below peacetime imports.

Cork is the bark of the cork oak tree which grows along the shores of the Western Mediterranean, being indigenous to the soil and climate of that region. When the tree is about 10 inches in diameter, the cork bark is stripped from the trunk. This does not injure the tree and the bark grows back and may be stripped at 10-year intervals thereafter. Cork trees live for several hundred years.

The first attempt to grow cork oaks in this country was made in South Carolina in 1787. Thomas Jefferson sent from France some cork across to William Drayton, owner of "Magnolia." No cork trees were obtained from this planting, but Jefferson continued his efforts to introduce the cork oak until his death, almost forty years later.

The United States Government became interested in homegrown cork about 85 years ago. In 1858 Cork acorns were obtained from Spain and distributed in the United States for planting by the

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Patent Department. From this effort some cork trees were started in the Southeastern States and California. Most of these died from lack of proper care, storms or other reasons. In 1880, more acorns were obtained and distributed to many places in the Southern States, Arizona and California. While some trees from this planting are still alive, many of them were lost. More recently, about 1941, some cork trees were planted near Pensacola, Florida. Only three of these trees have survived.

In 1939, Charles E. McManus, President of the Crown Cork & Seal Company, established a cork project to promote the growing of cork trees for the commercial production of cork. Under this project the Company assumes the costs for collecting cork acorns, growing seedlings and distributing the seedlings or acorns. After planting, the trees become the property of the planter. Efforts are made to locate all existing cork oaks and the cork is removed in selected areas every year for laboratory testing.

The cork project has been received with interest and enthusiasm throughout all of the Southern States. Large, healthy cork trees have been found growing in Virginia, North Carolina, South Carolina, Georgia and Alabama. Smaller cork trees have been located in Florida, near Pensacola, and in Shreveport, Louisiana. Records of the U. S. Department of Agriculture show that cork plantings have been made in Mississippi and Texas. In addition to these states, Maryland, Kentucky, Tennessee and Arkansas are planting cork trees.

Twenty cork trees have been found in Georgia and additional ones are still to be located. South Carolina has about sixteen, Alabama five, Virginia four, North Carolina two, Florida three, and Louisiana seven. Records of 10 other large cork oaks that formerly grew in these states were found.

Mr. McManus plans to continue the cork project until large areas of cork oaks have been established. After a reasonable period of time for growth elapses, the South will be producing a substantial amount of this essential product.

Steps to a Successful Stand of Alfalfa

Condensed from The Eastern Breeder

C. Otis Cromer

Professor of Crop Production, Pennsylvania State College

ALFALFA is a crop that is sensitive to its environment. It is more particular as to conditions for its growth than most of our other field crops. Therefore, the success one has in growing alfalfa will depend upon how completely he provides the proper conditions for growing the crop and the way in which the crop is managed. George Washington in his day wrote of the difficulties in growing alfalfa, not fully appreciating the difference between alfalfa and other more commonly grown crops.

There are at least five conditions that are necessary for the maximum success in securing a stand of alfalfa. These conditions in the main have to do with the soil.

The first one is the natural drainage of the soil. The alfalfa plant belongs to the group of deep-rooted plants. Its root system is much more extensive than those of any of the small grains. For this reason alfalfa will not stick on fields on which small grains may be successfully grown. Alfalfa simply will not stand wet feet and by the same token will endure drought much better than any of our other legumes unless it be sweet clover. The water table in the soil should be at least three to five feet below the surface in order to permit proper aeration of the soil and to provide for the normal development of the crop.

The second condition is the organic matter content of the soil. Alfalfa, perhaps to a greater degree than all cereals and most other legumes, requires a goodly supply of organic matter in the soil for the crop to thrive and make its maximum growth. If the supply of organic matter is not up to normal, a rather heavy application of farmyard manure should be incorporated into the soil when the ground is plowed. The manure should be well rotted and produced from weed-free hay or straw. At least eight tons of manure per acre should be applied to the ground, and more if the soil is inclined to be close.

A third requirement for success in growing alfalfa is that the soil be approximately neutral or alka-

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line. To insure this condition a representative sample of the soil should be tested for its lime content and enough lime added to insure an alkaline soil. Alfalfa is the most exacting of any of our commonly grown legumes as to the calcium supply in the soil. Any of the forms of lime will be equally satisfactory. The important fact to remember is that one ton of burned lime is equal to one and one-half tons of hydrated lime and to two tons of finely ground limestone (at least 70 per cent passing through a 100 mm. sieve) in the amount of calcium supplied. The lime should be applied immediately after plowing the ground. Which form one should use will depend upon the relative initial cost, the distance of transportation, and his personal preference.

Having met the drainage, organic matter, and lime requirements of the seed bed, one should look after the mineral supply—which is point number four in the list of important conditions of the soil. The amount of available phosphorus and potash in the soil in addition to the calcium is of special importance. Alfalfa is a very heavy user of potash and calcium. This is shown by the fact that a three-ton crop of alfalfa removes 50 pounds of potassium and 67 pounds of calcium as compared to 35 pounds of potassium and 11 pounds of calcium which are removed by a 50-bushel crop of corn and the stover from this crop. If one can delay the application of phosphorus and potash for at least a month after harrowing in the lime, it is all very well. Some claim that phosphorus and potash applied before liming become fixed by the free iron and aluminum which are generally present in an acid soil and which the lime renders inactive. On the other hand, others claim that they have found no disadvantage from applying the fertilizer immediately after the liming operation is completed. The quantity and brand of fertilizer may vary with the soil type but usually 250 to 300 pounds per acre of an 0-14-7 or a 2-12-6 applied if alfalfa is seeded with a small grain as a nurse crop is satisfactory. The amount of any particular element may vary with the soil type so that more of any one element than is shown may be needed.

As with other legumes, inoculation is the fifth condition that must be provided for success in alfalfa culture. If you are raising alfalfa for the first time or if sweet clover does not grow on your farm, inoculation is *very* essential. Previous experience has taught that the stand survives and the growth is much better where the seed has been inoculated. Some authorities claim that inoculating the seed each time a

field is seeded will even give increased returns over just the initial inoculation. Perhaps no other legume will languish and remain unthrifty as much as will alfalfa from lack of inoculation. The bacteria will not thrive in acid or water-soaked soils, hence the inoculation should not be applied until these other conditions have been satisfied.

Alfalfa may be seeded either in the spring or in later summer. When seeded in the spring a nurse crop must be used to help protect the slow starting alfalfa from the ravages of weeds. Spring seeding involves providing the previous year for alfalfa.

Adding lime to the previous crop relieves the rush of spring work when one is delayed in his field work by unfavorable weather. If the ground is excessively acid, it is often a good practice to divide the application of lime, otherwise all the lime may be applied at one time.

Seeding with oats or barley (at half the usual rate of seeding of cereals) is usually practiced when alfalfa is being seeded in the spring for the first time. After a successful stand of alfalfa has been grown on one field, it can be sown on winter wheat or with spring grains as one would sow red or alsike clover. The seed *must* be inoculated when seeded, however, and covered lightly.

Late summer seeding where moisture in August is reasonably sure will also give successful stands. When a late summer seeding is made the ground should be plowed at least six weeks prior to the date of seeding and frequently worked with a cultipacker and harrow during this period to get the seed bed in a firm, finely pulverized, level condition. Late summer seeding does not require a nurse crop, for the reason that weeds usually are not a factor. Frequent cultivation during July and August should eliminate most of the weeds that might otherwise hinder the crop. The minerals should be applied in advance of the seed and disked or harrowed in, in order to eliminate the danger of injury to the inoculation which should be applied with the seed.

The seeding should be done at a date that will permit at least six or eight weeks of growth before the time of the first killing frost. Just preceding a shower is the best time to sow, but if no shower materializes, after seeding the ground should be cultipacked to help cover the seed and pack the soil particles close to the seed so as to insure better germination.

New One-Man Pick-up Baler

Condensed from Farm Machinery and Equipment

AS if to forecast the shape of things to come after the war, one farm equipment manufacturer has announced a one-man pick-up hay baler of entirely new design which is intended to take the backaches out of haying and convert another farm job to a one-man, family-farm operation. The new baler has already proved itself, according to an announcement by the Allis-Chalmers Tractor Division, which states that it will be put into production "as soon as machine tools and materials are again available."

Both the baler and its bales are highly unconventional. One man —the tractor driver—handles both tractor and baler, which is operated by power take-off. He sits up front on the tractor. The baling operation is automatic and ordinary binder twine is used instead of wire. Bales are cylindrical in shape, the hay being *rolled* into a tight, compact bale, similar in appearance to a strip of carpet rolled and wrapped.

Rolled bales, says the announcement, have been found more tightly compressed than conventional square bales. Since the stems are curved around the bale and tightly held, they serve to shed water and to reduce absorption, making the bale more resistant to weather. Bales are approximately three feet long. Diameter and density can be regulated to suit the need. For easy handling, bales are normally made to weigh 65 to 70 pounds each. Twine costs about one-third less than baling wire, is easier to handle and is less dangerous to livestock. A twine box holds enough footage to wrap approximately ten tons of hay.

In widespread field tests conducted in different sections of the country, the one-man pick-up baler, the company claims, has demonstrated a capacity equal to or greater than that of compression type balers with three-man or four-man crews, under like conditions. It weighs less than a ton and a half, is mounted on two rubber-tired wheels, has a hinged tongue that permits trailing the baler back of the tractor for travel over narrow roads and for easy access to farm gates. The price has not been announced, but if the baler's light weight is any criterion, it will be definitely within range of the small farmer's pocketbook. It can

Reprinted by permission from Farm Machinery and Equipment, July, 1943

be operated to capacity from the power take-off of any two-plow tractor.

The baler's pick-up mechanism is simple, and, in combination with the press roll, is designed to save the maximum number of leaves which contain some 80 per cent of the feeding value of hay. Although intended primarily for pick-up baling of hay, or of straw after the combine, the unit is also adaptable to stack baling.

Since hay is the heaviest of all U. S. crops from a tonnage standpoint, A-C engineers have felt for some time that machinery should be designed to relieve human muscle of the tremendous lifting job which has always been associated with haying. Last year's hay crop totaled more than 105 million tons, which is about one-fourth greater than the total weight of our record 1942 corn crop and around three and one-half times heavier than the total wheat crop. Contrary to the trend to one or two-man family operations in handling other crops, haying has remained pretty much a large-crew, neighborhood project. The new one-man pick-up baler is designed to enable the individual farmer to save his own crop without the need for outside help and without undue physical labor.

Be specific when assigning work to a person who, though not as familiar with farming as you are, has volunteered to help meet your labor shortage. Show exactly what you want done and how. Demonstrate the task one step at a time, and then observe while the worker tries to do the task.

—Farm Science Reporter

How to Mow and Graze Kudzu

Condensed from The Progressive Farmer

R. Y. Bailey

Regional Agronomist, Soil Conservation Service

IMPROPER mowing and grazing have often resulted in serious injury to kudzu stands. Cuttings made too frequently or at the wrong time of year have usually so weakened stands that broomsedge has come in and gradually crowded the kudzu out. In other instances, kudzu that was mowed or grazed properly has remained in a strong, vigorous condition for many years.

Usually, one cutting made early in the summer, before August, has not damaged stands. One cutting in late August or September has often weakened the plants, particularly with very dry weather the remainder of the fall. When kudzu was cut several times each year, the stand in most cases was practically destroyed within two or three years. Cuttings made early in the summer and late in the fall before frost, have brought little damage.

September is probably the worst month to cut kudzu for hay. New growth after cutting is supported largely by the stored material in the fleshy roots. If cut for hay in September, the new growth draws heavily on the stored material in the roots and frost usually comes before enough top growth has been made to fatten the roots up again. Thus, many of the crowns fail to live through the winter. When, on the other hand, hay is cut so late in the fall that no new growth occurs before frost, the roots go into the winter in good condition.

Early mowing also gives a better hay than is made from August and September cuttings. Hay cut early in the season retains a larger percentage of the leaves than mowings delayed until early fall. Leaves cut in late August or September are also coarser and lower in palatability. The loss of leaves also results in a rather coarse, stemmy hay that is not eaten so readily as leafy hay cut early.

Kudzu hay cures rapidly, but loses leaves and bleaches if cured in the swath. Those who have made hay of best quality have raked it a few hours after mowing and allowed it to remain in the windrow until dry enough to haul into the barn. In some cases, it has been stacked around

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poles or on racks, but this requires more labor.

Kudzu is a good pasture crop when grazing is properly regulated. Farmers who have been most successful in pasturing kudzu have kept stock off in the spring until there was enough top growth for a cutting of hay, and thereafter have regulated grazing so that the ground was kept well covered by green foliage.

In some instances, farmers have been forced to seriously overgraze to keep cattle in good condition in periods of drouth. Where they applied fertilizer the following spring and kept stock off until late summer or fall, the stand was usually fully restored. Field observations have indicated that kudzu will stand close grazing one year, if proper treatment and rest are given afterward, but that two successive years of overgrazing will practically destroy it.

Kudzu is a good forage and pasture crop, but it has its limitations. Those who find out how much mowing and grazing it will stand and treat it accordingly will maintain vigorous stands for many years.

Lespedeza Caution

Careful control of lespedeza grazing during fall months, and the cutting of lespedeza early for hay, are two recommendations being made to dairymen by the University of Missouri Dairy Husbandry Department. Missouri dairy farmers indicate that milk production may drop as much as 20 to 30 percent where cows are kept on lespedeza during late fall months, particularly at the time when seed is beginning to form. One cause of reduced feeding value is a rapid increase of lignin content as the plant matures. This indigestible fiber portion of the plant has a binding effect on the protein and carbohydrates, resulting in a greatly reduced total food value. A second cause for lessened feed value may be the tannic acid content which becomes fairly high during the seed-forming stage. Lespedeza seed makes an excellent source of protein for dairy cows when ground fine, comparing favorably with cottonseed and soybean oil meal. Missouri farmers are encouraged to harvest seed on much larger acreages than at present, thus insuring their protein supply. However, for hay purposes lespedeza must be cut early; and such crops as Balbo Rye, barley, wheat, sweet clover, and permanent pasture should be used for grazing dairy cows during late fall months rather than keeping the cows on lespedeza pasture.

—*Successful Farming*

Uncaptured Protein

Condensed from Pennsylvania Farmer

John A. Smith

TREMENDOUS increases in production of livestock, milk and eggs to supply our armed forces and the civilian population of this and allied nations have reduced protein feeds to a dangerous point. The increased production of soy beans and peanuts has not kept pace with the demands of feeders for protein meals. Any development, therefore, to capture protein from any source is of interest to agriculture. An industrial alcohol company of Philadelphia is turning by-product protein into beef. They are feeding 400 steers at a farm near Pottstown and are expanding their operations to include 2,000 steers. Their base feed is thin slop from a distillery.

Distillers have recovered the heavy grains from their fermentation vats for many years. After pressing out the thin residue they have dried the heavy grains and marketed them as distillers' dried grains. The drying of the thin residue was made difficult, nearly impossible, by the gluey nature of the substance. Drying equipment "gummed up" and the labor to clean the rolls and conveyors ate up the profit from the process. It has been discovered recently that modern dehydrators like the egg and milk dehydrators in common use will dry this thin slop, but the critical metal situation precludes the use of copper for so vast an enterprise as this one. The thin slop when dried contains 42 per cent protein. A gallon yields two pounds of protein concentrate when dry. Hence it is easy to understand why the Publicker Industrial Alcohol Company looked about for a source of use for this waste product. They employed an agriculturist named Victory Aubrey to find a way to use the by-product.

Mr. Aubrey called in specialists from the Bureau of Animal Industry at Washington and from the Extension Service at State College. They showed interest in the project, but no particular hope that steers could live and thrive on a liquid diet and consume any appreciable amount of this substance. Mr. Aubrey had analyses made of the material and finally adopted a course of feeding all the thin slop steers would drink and then supplying 5 to 7 pounds of hay or other roughage per day as a digestive vehicle.

When alcohol is made from

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corn, enough vitamin A is carried into the residue to supply normal needs of the animals. When wheat is used vitamin A must be supplied in shark-liver oil. On this diet, steers have gained an average of 2 pounds a day and when killed dressed 60 to 63 per cent. The experiments of this company are being conducted on three farms near a distillery in Montgomery county. In this plant a carload of wheat is used a day. The slop from this distillery will supply 2,000 steers, with feed and roughage furnished from hay crops as far as possible. If the residue from one carload of wheat is sufficient for 2,000 steers, a fair concept may be had when one realizes that the operation of this one alcohol company consumes 75 carloads of wheat a day. The alcohol derived from this wheat is used for explosives now, but as soon as the company has completed a synthetic rubber plant in Bucks county, a vast quantity of wheat will be used there in the manufacture of butadiene—a base ingredient in rubber manufacture.

The feeding of this thin slop in liquid form is an expedient to use high grade waste material until better and more permanent uses may be devised. The company has applied to the War Production Board for authority to use critical materials for the erection of a dehydrating plant. This plant, if approved, will require a year for erection. But the War Production Board and the Department of Agriculture are trying to determine if grain alcohol will be in production at the plant one year from now. This is normally a molasses plant, and when the submarine problem subsides, it will undoubtedly go back to the use of molasses as a source of alcohol. In this case, a large dehydrating plant would not be needed.

Now research chemists of the U. S. Department of Agriculture have come forth with a plan that may erase the necessity for any new dehydrating equipment. They propose to extract the protein from grain before it goes to the distillery. Recent experiments seem to point to a flotation process of removing protein by adding one-tenth of one per cent solution of sodium sulphite to large tubs of grain mash or granular flour. The chemical reactions cause the protein to rise to the surface like cream on milk. Then this substance is floated off before the grain mash goes to the fermentation vats of the distillery. A bushel of wheat will yield a little over seven pounds of protein, and that represents the average total of digestible protein in wheat which is commonly placed at 11 to 12 per cent.

By the use of wooden vats, it may be possible to capture this

protein for livestock and even humans, we are told, without taking the vital steel and copper required for evaporation after distillation is completed. We are also told that fermentation will be aided by the sulphite process to the extent that less malt will be required. The total of accrued benefits from the contemplated changes may be summed up as follows:

1. During the present year about 100,000,000 bushels of grain (principally wheat) were used for distillation of alcohol. During the coming year, 180,000,000 bushels of grain will be used for alcohol—the increase going into synthetic rubber plants. By the conversion of alcohol distilleries adapted to the use of molasses to that product between 40,000,000 and 60,000,000 bushels of wheat would be made available for livestock feeding.

2. When alcohol is made from granular flour the bran and midlings are removed from the wheat in flour mills where rolls are spaced to prevent crushing the grain. If this flour is treated with sulphite the protein can be removed before fermentation and distillation. This process would yield 430,000 tons of protein annually if adopted nationally by distillers. From facilities now existing and under construction 40.7 per cent of total protein is being recovered from the manufacture of alcohol. The adoption of the USDA program of recovery would yield about 70.6 per cent. It is proposed to adopt this protein conservation program in one form or other in 34 distilleries throughout the country. Four have received initial approval. The total cost of the overall program would be about $15,000,000. The value of the annual output of these facilities would be about $23,000,000.

3. We now have four head of livestock for every three that farmers raised during the past five years. This increase calls for greater feed production. Elevators that bulged with grain years ago are low now. The great piles of wheat on the ground in Kansas and Canada two years ago have disappeared. The wheat carryover this year is 630,000,000 bushels, but with the synthetic rubber, industrial alcohol and feed wheat programs more than 400,000,000 bushels will disappear this year into channels unused twenty or even five years ago. While our farm production is 42 per cent higher than during the last World War, this bigger, tougher, harder war is clamoring for more meat, more eggs, more milk, more planes, more tanks, more everything. We cannot afford to plow up the dust bowl again. We must do the most with the things we have. Valuable protein must be put to work.

New Soil Tests for Phosphorus

Condensed from The Hereford Journal

TWO new soil tests for phosphorus which will save both money and needed war materials for farmers and the nation have been developed by the University of Illinois College of Agriculture, Urbana, it is announced by R. H. Bray, associate chief in soil survey analysis. The tests, hailed as vastly superior to the former test for phosphorus in the soil, were perfected by Mr. Bray and his associates after more than three years of research work. Through use of the tests it is now possible for farmers to save money on phosphate fertilizers and at the same time help conserve sulphuric acid for war needs.

Directions have been prepared for distribution to chemists and agriculturists who may be interested. Solutions for making the tests will not be put out by the University of Illinois, but will become available through the regular commercial sources for such materials.

One part of soil and seven parts of an ammonium fluoride extracting solution are shaken together. After the soil has settled, eight drops of an acid molybdate solution are added and stirred with a tin rod. If the soil is high in phosphorus, a deep blue color develops. If it is low in phosphorus, there is no color. Test No. 1, which measures only the rapidly soluble absorbed forms of phosphorus, depends for its extraction mainly upon the ammonium fluoride. Test No. 2, which measures the combined adsorbed and acid soluble forms, contains the ammonium fluoride plus an excess of a strong acid, such as hydrochloric.

The new tests have the possibility of conserving thousands of tons of sulphuric acid for war needs and of saving money for farmers by locating soils where excess superphosphate has been used in the past. Extensive areas of such soils are believed to exist in the southeastern states, especially where cotton, tobacco and truck crops have been grown for years with large amounts of commercial fertilizers.

It is estimated that millions of acres of such soils have accumulated enough phosphorus reserves in highly available forms so that they can be farmed with decreased rates of fertilizer applications or with fertilizers lower in phosphorus. This will mean cash

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savings to the farmer who finds he has accumulated a reserve of phosphates in forms still highly available. The tests will also show him which of his soils are still highly deficient and where the full rate of application should be made.

Decreasing the amount applied on high-testing soils will cut down the total amount of superphosphate needed and release supplies for the more deficient soils as well as reduce the total consumption of sulphuric acid, a product needed in other defense work.

Most noteworthy point about the new tests is that they are the first to distinguish between the readily available, or adsorbed, forms and the acid-soluble forms of phosphate in the soil, according to Mr. Bray. The adsorbed forms are those concentrated on the surface of the clay particles of the soil. The acid-soluble forms are those such as rock and bone phosphate. The adsorbed forms not only are more soluble, but also more rapidly soluble than the acid-soluble forms. Hence a distinction between the two forms is necessary, and this can be done only with two tests.

"Only by running both tests can a true evaluation be made of the phosphorus status of the soil. In special situations, however, only one or the other of the tests may be necessary," Mr. Bray says.

Test No. 1 will be particularly useful for tobacco, cotton and truck-crop soils on which heavy applications of fertilizer are the rule and a high state of phosphorus availability is desired. In most soils soluble phosphates when first added go directly into the adsorbed forms which have a relatively high availability for all crops. As these forms are built up by repeated applications, the original rate of application can be greatly reduced. These new tests, especially No. 1, can now be used to determine whether the build-up has been sufficient to warrant a reduction in the amount applied.

Test No. 2 will be more useful for field crops, such as grown in the Cornbelt, and will replace the original phosphorus test put out by the University of Illinois College of Agriculture in 1929. However, test No. 1 also will be necessary for certain crops.

The F. F. A. Contribution to National Defense

Robert McFate

SECOND PRIZE IN THE ESSAY CONTEST

SOMEONE may ask "What can boys do in defense work?" At first thought not many answers seem to be given, but when the "Future Farmers of America" are counted, the defense work of this organization cannot be estimated.

In 1917, vocational agriculture was established in rural high schools and then in 1928 the Future Farmers of America organization was formed at a meeting in Kansas City, Missouri. Today in forty-seven States, Hawaii and Puerto Rico, six thousand and three hundred local chapters and more than two hundred six million boys are members of this organization.

A boy enrolled in a vocational high school course becomes a "Green Hand" and then upon definite accomplishments he becomes a Future Farmer. After two years in vocational agriculture and certain requirements a Future Farmer can become a "State Farmer."

If a State Farmer can reach the Goal and meet all requirements, he may be made an American Farmer, which is a coveted honor in this organization.

In Union there is the organization gaining strength and the Future Farmers have joined themselves to defend their country in many ways and under all conditions. Patriotism and good citizenship have been stressed since 1928. Perhaps this emphasis is the F. F. A.'s finest contribution to national defense.

Future Farmers are found in every division of our armed forces doing actual service in defense, but a majority of their members are carrying on defense work at home. Buying defense bonds and stamps has been encouraged by the boys as well as by the organization. Every dime has found the F. F. A. ready to help and contribute to the desired goal. The Red Cross and U. S. O. also have been aided by the F. F. A.

When the nation called for the "Scrap Drive" the Future Farmers of America went to work with the will to do a good job. They went to the farms and gathered the scrap, dismantled old worn out machinery, and loaded it to be delivered to the buyer. This was real work, but the tons of much needed iron were gathered

in a short time. They aided in the collection of the cans and aluminum.

The shortage of new farm equipment has made it necessary to repair and rebuild old machinery for farm use. Many chapters have undertaken this work and with the aid of the vocational instructor have been able to be real defense workers for the farmer.

When the fruit trees were to be sprayed, in many localities, the F. F. A.'s volunteered to spray the trees at a very reasonable rate. The fruit harvest came on and many men could not be hired so again the boys picked and stored the fruit. Likewise the chapters sprayed potatoes and then picked potatoes and helped market them. Thus were much needed articles of food saved for defense.

F. F. A. members have always been interested in pork, beef, and poultry raising. This year, as never before, the boys are trying to increase production.

The raising of ton litters of pigs has been encouraged. This means that one litter of pigs must weigh one ton at the age of six months. Better care of the sows and saving of more baby pigs is being emphasized. The F. F. A. has in many communities bought a purebred sire and purebred gilts to encourage better pigs and better meat for the buyers. The F. F. A. has done a remarkable job in producing pork for defense. Baby beef veal, mutton, lamb, have also been produced by the boys.

Perhaps poultry and eggs have been emphasized most by many F. F. A. chapters. Although turkeys and geese have been raised by some boys, most of the boys raised chickens or capons.

The pullets are kept for eggs, while the roosters and capons are sold for meat. In food for defense these projects have been enlarged until the boys are furnishing many markets with eggs and poultry. They have encouraged the raising of better chickens under more sanitary and profitable conditions.

The boys are capable of gardening and producing vegetables of all kinds for home, markets, and canneries. In some states the boys have rented farms and carried on extensive gardening projects, producing food for freedom. In Oklahoma, last year, five thousand six hundred boys farmed fifty-seven thousand acres, kept seventeen thousand head of livestock and had a labor income of one hundred thousand dollars. Texas did almost as well. There was a real job to be done and the F. F. A. was on the job to do it. They are not the forgotten youth of America; but they are the living and alert men of tomorrow.

A Future Farmer ranks with the doctor, merchant, engineer, carpenter, and mechanic. He sells and buys; operates motors and engines; applies science in selecting seed; in fighting pests and in feeding stock. A farmer is called upon to have a wider knowledge than any other business man. He cannot learn these things by observation and experience alone, but must be ably schooled and progressive. Now the Future Farmers must take up these responsibilities for defending their ideals and rights in this nation.

Rural youths can perform no greater service for defense than to perpetuate the democratic way of living; co-operation and leadership are two specified objectives in the code of the F. F. A. For better living and higher moral ideals in the defense of their homes and their country, the boys must be leaders in social welfare and co-operation.

Conservation activities are problems for the F.F.A. to solve: the conservation and upbuilding of soil; the protection of the forests; the conservation of time and talent for farming.

In view of agriculture's light today, shortages of man power, equipment and unsettled prices, one might wonder why so many boys aspire to be farmers.

But there are tens of thousands of boys who are preparing to be tillers of the soil and calling themselves in so many words and so many deeds, the Future Farmers of America. The creed to which everyone of them has subscribed runs in part: "I believe that to live and to work on a good farm is pleasant as well as challenging, for I know the joys and discomforts of farm life and hold an in-born fondness for those associations, which, even in hours of discouragements, I cannot deny."

Boys, from fourteen to twenty-one, bound together by scientific study and the application of this knowledge to active production for home and national defense, are a great part of the Future Farmers of America.

Farming is a most essential industry. Armies cannot fight, defense workers cannot work, women and children cannot live without food. Here to the nation's rescue come the Future Farmers of America—ready to plant, to reap, to produce, to conserve, and to lead in the defense of this great democracy, until victory is won.

How to Feed Barley

Condensed from American Agriculturist

Roy H. Park

BARLEY and other feed grains have started moving into farm bins in the Northeast as the result of a program launched by the New York State Emergency Food Commission.

"Fortunately," says Prof. F. B. Morrison of the Animal Husbandry Department at Cornell, "barley is a satisfactory feed for all classes of stock." A check with Professor Morrison and Professors L. C. Norris and G. F. Heuser, also of Cornell, brought out these suggestions for feeding barley:

For Dairy Cattle

Ground barley and ground corn are about equal in value for milk production. Cows like barley in the mixture and eat it readily if the barley is coarsely ground. Barley for dairy cows should *never be ground too fine* since it may become pasty and cows won't like it.

Unless it is necessary don't feed barley as the only grain. A combination of grains is always better than feeding a single grain. This is particularly true of barley and wheat, since both of these grains tend to become pasty and heavy. When fed alone, either barley or wheat may cause digestive troubles. This can be prevented by feeding barley in combination with corn, oats or other grains. Though it is safe to feed as high as 60 per cent barley in the grain mixture, most dairymen do not use more than one-third to one-half barley.

For Poultry

Barley is a good poultry feed—nearly as good as corn or wheat. In feeding value it is better than oats.

In college tests, barley has constituted up to 45 per cent of the mash and all of the scratch grains with good results. Poultrymen who have other grains available, however, will do better to limit barley to about 40 per cent of the scratch.

Birds have to learn to like barley and for that reason it is well to start the pullets on it while they are still on range. They will eat it readily. In feeding barley to layers, it is best to start with a small amount in the scratch and then gradually increase the percentage.

Barley for Meat Animals

Barley is an excellent feed for beef cattle, sheep or swine, and is a first-rate substitute for corn in fattening such stock. Experiments prove that barley is worth, on the average, 88 per cent as much per ton as corn for fattening cattle, 87 per cent as much for fattening lambs, and 91 per cent as much for fattening pigs. Barley produces pork of excellent quality with firm, hard fat.

Barley should be ground or crushed for beef cattle and swine, but there is no need of grinding it for sheep.

For Horses

Barley is a good horse feed when properly used. It should be ground or crushed and should always be combined with some bulky feed such as ground hay or oats. Barley fed as the only grain may cause colic.

Barley is higher in feeding value than oats—in fact, it requires only about 90 pounds of crushed barley to replace 100 pounds of crushed oats.

How to Store Barley

Barley will keep indefinitely if it is stored in clean bins and protected from rats. If possible, have your bins up far enough from the floor so the cat can get under them to get after the rats.

If you haven't any granary, or if your granary is going to be filled with homegrown grain, you can partition off a corner of the barn or a corner of the hay-mow that is not filled. It takes about 2¼ cubic feet of space to store 100 pounds of barley.

Buffalo Grass Comes Back

Condensed from Kansas Farmer

L. C. Aicher

Superintendent Fort Hays Experiment Station

ONE of the brightest pictures in Kansas agriculture today is the triumphant comeback of buffalo grass, the most valuable grass in a large portion of the Great Plains area. While several other grasses help make up the native pastures in this section, buffalo is the most valuable constituent.

The urge to get back to grass much of the land plowed up following the first World War is growing steadily. Inadequate seed supply is still the retarding factor holding down the seeding of new acreage.

However, great strides have been made in overcoming this most troublesome difficulty. L. E. Wenger, grass specialist at the Fort Hays Experiment Station, has developed new high-yielding selections of buffalo grass especially desirable for pastures, and he also has isolated some very good lawn types. Some of these better selections are being increased for distribution. Some seed from one of these new selections was harvested last year and a large crop is in prospect for 1943, so that seed will soon be available in quantity.

Enterprising Kansas citizens, stimulated by the buffalo grass seed harvesting activities at the Fort Hays Experiment Station, also have harvested considerable quantities of native buffalo grass seed from the native prairies of Western Kansas and Eastern Colorado. However, yields on these areas last season were not very high, requiring combining over a large acreage to make harvesting profitable.

The low germinability of buffalo grass seed has in the past been one serious objection to its use. But Mr. Wenger, after many many trials, has evolved a treating process which steps up the germination of new seed from a normal of 5 to 8 per cent to a potential of 80 per cent. Further investigations also have proved that the seed must be planted shallow, which means not more than one half inch deep. Treating the seed for higher germination and planting the seed shallow are

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the two most important requirements in successfuly growing the grass.

Of course, a good, firm seedbed must be provided. There must be sufficient moisture available to give the seed a start and the weeds must be kept down the first season. Buffalo grass thrives in plenty of sunlight and it does poorly in the shade.

Many successful plantings of buffalo grass were made last season on pastures, lawns, football fields, airports and courthouse lawns, and these plantings are the best advertisement of the value of this grass for the many uses to which it may be put.

Successful pasture plantings of buffalo grass on the Fort Hays Station have been made every year since the development of a successful method of treating seed to insure high germination. Where treated seed was used in planting areas for pasture, light grazing was provided the second season after planting, but the weeds had to be mowed three times during the growing season. In the earlier plantings, in years of light rainfall, thin stands were obtained but these stands thickened up rapidly when given opportunity to develop.

During 1942, several large areas of rough land were seeded either to buffalo grass alone or to mixtures with blue grama. On Memorial Day, a few days after the grass seedings were made, a 4.49-inch rain fell in 5 hours which caused serious erosion, smothering, and crusting of the ground, but despite these difficulties successful stands were obtained on all plantings. Buffalo grass in particular was able to withstand this fearful punishment and is most responsible for the stand of grass obtained. One 15-acre field seeded to buffalo alone at the rate of 8 pounds of treated seed an acre, showed an average of 2.65 plants a square foot. An average of one plant to the square yard will provide a satisfactory stand in three years.

On the A. L. Hallsted farm at Bazine, 22 acres were planted in May with a mixture consisting of 1 pound of treated buffalo grass, 10 pounds of blue grama, and 2 pounds of sand dropseed an acre. This seed was broadcast by hand from the rear of a truck and covered by pulling over the field a wheat drill with chains and packer wheels down. The drilling equipment did not touch the ground. The land on which this was planted had been idle for 3 years. Six weeks previous to seeding the land preparation of the seedbed was begun by one-waying shallow with packer tied behind the one-way to firm the soil. The land was given the same treatment again just ahead of seeding. Both operations killed a crop of weeds. Weeds were

mowed once during the summer.

Mr. Hallsted says the buffalo grass produced results exceeding all expectations, but the blue grama did not do as well as anticipated and attributes the latter to lack of a good, firm seedbed and a torrential rain the latter part of May which undoubtedly affected the blue grama adversely.

A large portion of the Hays airport was seeded to a mixture of 6½ pounds of buffalo and 11 pounds of blue grama in the spring of 1942. The seeding job was done by Mr. Wenger as a demonstration, using Fort Hays Station new type drilling equipment built in the station shop. The land had been leveled, it was dry and dusty, and in places was pure clay subsoil. The area was subject to frequent landing of planes. Despite these handicaps and a heavy torrential rain the grass has come along very satisfactorily, the buffalo is spreading and will soon provide a heavy turf able to take much punishment.

Buffalo grass is best adapted to hard land. It will take hold on poor soil and, of course, will produce more abundantly on good soil. The recommended rate of seeding of treated buffalo grass seed for pastures is 8 pounds an acre. Where it is to be seeded in mixtures, 3 to 4 pounds of buffalo and 10 to 12 pounds of blue grama will produce a good stand. It requires two seasons to produce a turf which will stand normal grazing. Seeding is best done during April, unless irrigation is available. A good, firm seedbed is essential for the results you want.

Phosphorus for Beef Cattle

Condensed from The Shorthorn World

W. H. Black, Sr.

Animal Husbandman, U. S. Bureau of Animal Industry

FOR a score or more of years most of us who have been associated with beef production have given some thought to the feeding of minerals. In the main, we have dismissed it from our minds by concluding that if our cattle were fed a variety of feeds, including legume hays, cereal grains, protein concentrates, and common salt (sodium chloride), we had little to worry about as regards mineral deficiencies in the cattle ration. This reasoning was quite sound, for the grains and cereal products in general were good sources of phosphorus and the legumes were rather high in calcium, supplying the two minerals which make up the largest percentage of the mineral constituents of the animal body. We must not forget, though, that there are great numbers of cattle, possibly 50 per cent, that never get legume hays and grains, but must survive on native vegetation, much of which is low, not only in minerals, but also in protein and energy values.

The lack of phosphorus is one of the major nutritional deficiencies in many of the beef production areas, particularly in southern United States. There may be deficiencies in several of the essential mineral elements and in protein or carotene, but they do not appear to be as widespread as that of phosphorus. The habits of animals and their physical condition, such as chewing bones and stiffness in the fore-quarters accompanied by emaciation, indicate a phosphorus deficiency.

The importance of feeding phosphorus to cattle grazing a phosphorus-deficient range made a deep impression on me when I visited the Union of South Africa ten years ago and observed the excellent results obtained by feeding bone meal and dicalcium phosphate as a supplement to the range vegetation. The South African investigators at Onderstee-port have taken the lead in this field and a good job they have done.

For years beef producers on the "veld" were confronted with small percentage calf crops and in many instances with severe death losses among mature cattle. In

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1924, Theiler, Green, and Du Toit identified the trouble as a phosphorus deficiency and called this condition "aphosphorosis." The first symptoms of such a deficiency are usually manifested by a perverted or depraved appetite on the part of the animal as evidenced by the chewing of wood, bones, and miscellaneous materials. When the disease advances to the stage where the development of the body or growth is materially impaired, it is known as "styfsiekte" in South African, "stiffs" or "sweeney" in Florida, and "creeps" in Texas and other localities. In very advanced stages the appetite becomes so depraved that cattle eat rotten bones and when this material is infected with germs or organisms called "Clostridium botulinum," a disease known in South Africa as "lamsiekte" develops and usually proves fatal. This condition is probably identical with that known as loin disease in the United States.

I personally visited a ranch in South Africa where about 1,000 cattle were hand-dosed each day (six days per week), feeding about 3 oz. of bonemeal per head. The cattle under this system developed an appetite for the supplement and very little trouble was experienced in rounding them up, running them through the "chute," and in administering the dosage. This particular ranch was getting a high percentage calf crop and good growth in their cattle, due to the feeding of a phosphorus supplement. Cattle production had been a miserable failure on this ranch previous to the feeding of the supplement.

In South Africa where mineral metabolism of cattle has been one of the foremost nutritional problems for investigation for many years, Du Toit and Bisschop obtained significant results from the feeding of bonemeal to breeding cows grazing on phosphorus-deficient veld. In the experiment the cows and heifers in calf and lactating cows were fed 5 ounces of bonemeal daily (except Sundays) and all growing and dry stock 3 ounces. The calves were fed the bonemeal supplement from weaning at 9 months of age until 30 months old. The results of this experiment were outstanding and are no doubt applicable to many of our range production areas, especially in the South and Southwest. Over a 3-year period bonemeal-fed cows had produced an average calf crop of 87.3 per cent as compared to 56.3 per cent for the controls. In the bonemeal group 66.1 per cent had 3 calves in 3 years, while not a single cow among the controls produced a calf each year.

The feeding of bonemeal hastened sexual maturity and favored breeding regularity. Of the bonemeal-fed heifers, 84.4 per cent

became pregnant when turned with the bull at from 2 to 2¼ years of age, whereas only 73.7 per cent of the control heifers became pregnant. The average birth weights of the two groups were 68.8 and 68.1 pounds respectively for the bonemeal and control calves; but at weaning time (about 9 months) the calves from the bonemeal-fed cows weighed 16.5 per cent more, and at 30 months of age, 243 pounds or one-third more. The feeding of bonemeal significantly increased the milk flow of the cows, and this in turn favored increased growth and skeletal development of the calves. A study of skeletal development made through a series of body measurements showed a marked superiority of the bonemeal-fed calves in nearly every measurement taken.

Further experiments by Theiler, Green, and Du Toit showed that the inorganic phosphorus content of the blood is a useful measure of adequate or inadequate phosphorus nutrition. The inorganic phosphorus content of blood from animals receiving sufficient phosphorus varies from 4 to 9 milligrams per 100 cubic centimeters of blood, depending on the age and species of the animal; the younger the animal, generally speaking, the higher the inorganic phosphorus content. In phosphorus deficiency the inorganic phosphorus content of the blood decreases. The detection of mineral deficiencies through such analyses has contributed much to the livestock industry of South Africa. Similar methods are being used rather extensively by scientists in the United States and other countries for locating areas of mineral-deficient soils and the extent of the deficiencies.

The so-called deficiency diseases—loin disease, creeps, salt sick, stiff, hill sick, etc.—appearing in range-cattle herds, particularly in the South, are being investigated in view of the excellent results obtained in South Africa in the feeding of phosphorus to range cattle. The Department of Agriculture and the Texas Agricultural Experiment Station are carrying on an experiment in co-operation with the King Ranch in southern Texas to determine satisfactory methods of correcting phosphorus deficiencies in cattle on the range. A general survey covering several months and extending quite generally over southern Texas, indicated through the chemical analyses of hundreds of forage samples and of several soils that a phosphorus deficiency of considerable consequence exists in many sections of the Texas Gulf coast country.

The administration of mineral supplements to cattle in this experiment was begun in January, 1938. Four groups of 25 head each of yearling heifers were ran-

dom-selected and handled as follows:

Group 1: Controls (no supplement).

Group 2: Fed approximately 3 ounces of bonemeal per head daily (Sundays excepted).

Group 3: Fed approximately 1½ ounces of disodium phosphate per head daily.

Group 4: Fed approximately 3 ounces of bonemeal and 160 milligrams of manganese as manganous sulfate, 15 milligrams of copper as copper sulfate, 15 milligrams of zinc as zinc sulfate, 15 milligrams of cobalt as cobalt sulfate, and 15 milligrams of boron as sodium tetraborate (borax) per head daily (Sundays excepted).

All groups, including the controls, were handled through the corrals and chute so as to reduce any variable in handling to a minimum. The heifers in the mineral-fed group were individually hand-dosed. Blood samples were taken every 14 days from five heifers in each group, so that the blood from each animal was sampled every 70 days.

When this part of the experiment had been under way for only half a year, there had been a marked response to the feeding of the mineral supplements, as evidenced by the appearance and gains of the cattle, which were checked every 28 days. The analyses of the blood samples also showed a marked improvement in the inorganic phosphorus content of the blood in the groups fed mineral supplements over the control group.

In this experiment the supplements were fed so as to supply the dry cows and heifers 6.5 grams of phosphorus or 2.3 ounces of the supplement and the cows nursing calves 14.3 grams of phosphorus or 5 ounces of the supplement per head daily. The experiment was designed so as to keep the original heifers until they had produced two calf crops and then carry on with the heifer offspring, handling them as their dams had been handled.

The effect of feeding phosphorus to the original cows until they weaned two calf crops was evidenced by increased percentage calf crops and increased weight of calves at weaning time. The control cows produced a 58 per cent crop and the supplement-fed cows, 83 per cent, with the weaning weights of the calves from the control cows approximately 420 pounds, as compared to nearly 500 for those from the cows receiving a phosphorus supplement. If the calves from the supplement-fed cows were valued at 8 cents per pound at weaning time and those from the controls at 7 cents per pound, the value of the calves would be $40.00 per head for the former and about $29.50 for the latter, or a differ-

ence of over $10.00 per calf in favor of those from the cows fed phosphorus in addition to that received from the vegetation consumed. As the phosphatic supplements cost about $2.60 per cow per year, the increased value of calf at weaning time resulted in a nice increase in returns due to the feeding of phosphorus.

The value of feeding phosphorus was also revealed in increased weights of heifers at one year of age, those from the supplement-fed groups averaging 541 pounds, as compared to 441 for those from the controls. When the blood analyses showed the inorganic phosphorus content to be below 4 milligrams per 100 cubic centimeters of blood, it was quite evident that the animal was suffering from a deficiency of phosphorus. The results of these studies to date check very closely with the findings of the South African investigators.

By the spring of 1941 it was clearly evident that there was no advantage in feeding a number of trace mineral elements in addition to phosphorus. It was also shown that it made little difference as to the source of phosphorus whether it was from bonemeal or disodium phosphate. Accordingly, the experiment was revised during the summer of 1941 by throwing all supplement-fed heifers (yearlings and two-year-olds) together and feeding them all disodium phosphate by hand dosage six times each week. The control heifers use the same range and are handled through the chute just as are the hand-fed heifers in order to have as little variation between the handling of both groups of heifers as is possible. As these two groups of heifers will yield the proper comparison between phosphorus and control groups, the original cows were eliminated in the summer of 1941.

In order to obtain information on more practical methods of administering phosphorus to range cattle, the following procedure was begun in the summer of 1941 with new groups of yearling heifers.

Group 1: 43 head (controls), no supplement to range.

Group 2: 43 head—range with bonemeal supplement kept available in self-feeders.

Group 3: 43 head—range with disodium phosphate in water supply.

Group 4: 43 head—range with superphosphate in water supply.

Group 5: 62 head—range fertilized with superphosphate.

The 1941 summer and fall season has been unusually favorable, due to excessive rainfall, for plant growth, and accordingly very little difference has been noted to date between any of these new groups of cattle.

If in normal years it can be

shown that cattle on phosphorus-deficient range will consume sufficient phosphorus from bonemeal fed in self feeders, through their drinking water treated with disodium or superphosphate, or through the use of fertilized pastures, the cattle producers in phosphorus-deficient areas will be eager to employ one or more of these practical methods of administering phosphorus to their cattle and thereby materially increase their returns not only by an increased percentage calf crop, but by heavier and growthier calves as well.

There are numerous sources of phosphorus suitable for use in cattle feeding, namely, bonemeal, spent bone black (supply rather limited), dicalcium phosphate, disodium phosphate, superphosphates (if they do not contain fluorine and arsenic in sufficient quantities to be injurious to livestock), and others of lesser importance. In choosing between these sources it should be taken into consideration that bonemeal is palatable to cattle and no trouble is experienced in getting them to eat it, whereas dicalcium phosphate and disodium phosphate are seemingly not palatable when fed alone. The former is only slightly soluble in water and accordingly must be hand-dosed or mixed with salt or a palatable feed. Disodium phosphate and some of the superphosphates are soluble in water and can be placed in the drinking water, but this can be done satisfactorily only when the cattle are compelled to get their water from a supply treated with the salt. The South African investigators reported that when disodium phosphate (20-per cent phosphorus pentoxide) was dissolved in the water supply at the rate of 45 grams per 6 gallons of water, the cattle drank 5.8 gallons of water each, and thus obtained 1.56 ounces of phosphorus pentoxide daily, or 0.68 ounce of phosphorus.

Generally speaking, any mineral or feed mixture that will supply approximately 15 grams of P_2O_5 or 6.5 grams of phosphorus per head daily to dry cows and 33 grams of P_2O_5 or 14.3 grams of phosphorus for cows in lactation should prevent a phosphorus deficiency in cattle grazing on phosphorus-deficient range, and possibly correct an existing deficiency if the disease has not reached advanced stages.

How They Handle 4,000 Hens Per Man

Condensed from Poultry Tribune

Roy E. Jones

University of Connecticut

THE time of only 2½ men is required to take care of 10,000 breeding hens in one large house at Fellows Brothers Farm, Norwichtown, Conn.

Imbert and Arthur Fellows have been operating a large poultry breeding farm for some 30 years. Modern equipment and labor efficiency have been outstanding in their operations. Six years ago they started building another large house with regular farm help which took about two years to build. The house is 312 ft. long, 36 ft. deep and five stories high. It is built into a hill, allowing an entrance to all floors on ground level. The house includes 31 laying pens, each 36 ft. x 38 ft. and has a feed room on each floor. The pens carry 325 hens each, plus male birds, making a total of 10,000 breeding hens in the house.

The house is insulated throughout. Insulation board was used on the side walls outside of the studs. Furring strips were nailed outside of the insulation board over the studs, leaving an inch air space beneath the sheathing with paper and shingles on the outside. The roof is a rather low, even span covered with 18 in. blind nailed paper. The large roof ventilators originally were intended to be used as a part of the ventilating system, but they now serve to ventilate the loft only. The ceiling is sheathed with insulation board and covered about six inches deep with shavings. This construction means drier litter and less frequent changing.

Slot ventilation in the front and sliding glass windows has proved more satisfactory than the ceiling ventilators. Regular slot ventilators were constructed on the lower floors, but the tops of the windows are used for ventilation on the upper floors. The house maintains an even temperature very satisfactorily through cold weather, because of the insulation and its extremely large size which means relatively little exposed wall area per hen capacity.

Feed rooms and carriers are located on each floor. The feed rooms are at the end built into

Reprinted by permission from the Poultry Tribune, Mt. Morris, Illinois, May, 1943

the hill; the carriers are in the center of the pens running the entire length of the house on all floors. This is a tremendous labor saver in feeding.

Roost frames and pits are located at the rear of each pen about 4 ft. from the back wall; the pits are 8 roosts wide; they can be cleaned when necessary by using a litter carrier on the feed carrier track; a manure chute at the high end of the building is located so manure can be dumped from all of the floors directly into the dump truck; the litter may be cleaned in the same way. The time for cleaning must in part fit the convenience of a neighbor who purchases the manure.

The nests are located above the rear edge of the roosts, allowing a 4 ft. alley against the back of the house for collecting eggs. The alley is used by the hens and is not a separate alley. This arrangement speeds up the labor of collecting eggs. The egg room and egg storage room are located at about the center of the house on the second floor built into the hill with stairways leading directly to all floors up and down. This cuts the travel in collecting eggs to a minimum. This is a real factor when you stop to think that the hens in this house produce close to ½ ton of eggs per day at peak production. An electric egg grading scale is used to grade the eggs to meet hatching and market requirements.

A constant temperature egg holding room is built into the hill adjoining the egg room. This room, which is 100 percent concrete, requires a small amount of heat from an electric heater in the winter, but remains at a constant low temperature in the summer. The humidity in the egg room is maintained by seepage through the back wall or by adding moisture when needed. The eggs from 2,000 hens in a neighboring house are graded and packed in this egg room also. The work room in front of the egg room and egg storage room provides an opportunity for backing the truck directly into the building while loading eggs. The egg room capacity is considerably over 100 cases, which would take care of a week's production during the maximum season.

The water system is unique. The water supply comes from a nearby spring which flows constantly. Water is pumped continually to the top floor where it flows by gravity from each fountain to the fountain below until it reaches a drain below the lower floor. Each fountain pan is about one inch deep and about six inches wide located in the center of a tile. The pump is controlled by a time clock which turns the pump off during the night, except in extremely cold weather when

the water is kept flowing to avoid any possibility of freezing. The rate of water flow is fast enough to keep the fountains clean, thus requiring no labor whatever for water except to see that the pump is working and that the water is flowing properly. There are two water fountains located in the front of each pen.

Feed hoppers and feeding have been arranged to reduce labor as much as possible. The feeders are ordinary V-shaped troughs, 6 ft. long with 7 in. and 8 in. sides set as high as the hens can reach from the floor, with a wire and a screen door spring stretched along the top. This keeps the hens out, and makes the hoppers easy to fill. About ten hoppers per pen running north and south are placed between the front of the house and the location of the carrier. The hens are fed mash in the morning, pellets at noon, and scratch grain at night, with the exception of one floor which is receiving all-mash in the morning and pellets at night. Fellows Brothers report satisfactory results from the all-mash trial and at present are inclined to place the entire house on all-mash next year. All feed is purchased ready-mixed.

Egg production in March was 60 percent from 8,000 pullets and 55 percent from 2,000 old hens. Pullet production has continued heavy since early last fall, the peak for the entire flock being about 65 percent. Fellows Brothers prefer to move all laying hens out in summer laying shelters during the summer, clean house, and refill with pullets, but this is always a problem because of the lack of available space and labor, as every commercial poultryman must well know.

Litter management is unique to this extent: a garden tractor is used in the pens to stir the litter. The feed hoppers have to be moved over or placed on the roosts. The garden tractor will do a real job of stirring the litter in a short time. Deep litter is used, and the litter is not changed during the entire year. The roosting pits are cleaned each month or so, when necessary.

The labor features in this house are just plain wholesale operation and Yankee ingenuity to eliminate all of the labor possible and to make every hour count. The men put in eight hours a day, starting at 7:30 a. m. and working until 5 p. m. Then pens are lighted, using an automatic time clock from 5 a. m. until daylight, with no light in the evening, which means that days during the winter end before 5 o'clock. The regular labor schedule is feeding, picking up eggs, and grading and packing eggs. A surprisingly large part of the time is employed in gathering, grading and packing eggs, because of the tremendous

volume of production. Ventilators and windows have to be adjusted for changes in temperature, but it is surprising how little adjustment is necessary, because a large house develops heat and loses heat very slowly as compared to small houses where temperature fluctuates quickly with outside conditions.

Other farm activities carried on are a careful breeding program including trapnesting and pedigree hatching. All of the layers on the farm are Barred Plymouth Rocks. Sexed Rhode Island Red males are purchased each year to take care of the necessary crossbred matings in producing sex-linked cross pullets. At the present time, there are 19,000 sexed pullets being brooded on the farm and about 2,000 cockerels are brooded for breeders and a few for meat.

The farm employs seven men besides the two owners at the present time. This includes breeding, incubation, brooding, care of growing stock, repairs, remodeling and the management of the large laying house.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Beekeeping — By Everett Franklin Phillips, Professor of Apiculture, Cornell University. The Macmillan Co. $4.00.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Farm Accounting—By Donald R. Mitchell, Asst. Prof. Agri. Economics, Univ. of Wisc. McGraw-Hill Book Co., Inc. (1941). $2.50.

Farm Shop Practice—By Mack M. Jones, M.S., Prof. Agri. Engineering, Univ. of Mo. McGraw-Hill Book Co., Inc. $2.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. The Macmillan Co. $2.90.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Farm Records—By John A. Hopkins, Ph.D., Asso. Prof. of Economics, Iowa State College. Iowa State College Press. $2.50.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Gardening for Good Eating—By Helen Morganthau Fox, Gardener and Author. The Macmillan Co. $2.50.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

Hunger Signs in Crops—Published by the American Society of Agronomy and The National Fertilizer Association. $2.50.

Home Vegetable Gardening—By Charles S. Nissley, Extension Horticulturist in Vegetable Growing. Rutgers Univ. Press (1942). $1.50.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw-Hill Book Co., Inc. $4.00.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Poultry Management—By James E. Rice, Emeritus Professor of Poultry Husbandry, and Harold E. Botsford, Extension Professor of Poultry Husbandry, both at New York State College of Agriculture. Fourth Edition (1940), John Wiley & Sons, Inc. $2.75.

Practical Horse Breeding and Training — By Jack Widmer. Charles Scribner's Sons (1942). $3.00.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Sheep—By Levi Jackson Horlacher, Prof. of Animal Husbandry, Univ. of Kentucky. The Interstate Printers and Publishers. $2.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of the Horse—By George R. Conn, B.S.A.H., D.V.M., Orange Judd Publishing Co., Inc. (1942). $1.50.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

Soybeans—Gold from the Soil — By Edward Jerome Dies. The Macmillan Co. $1.75.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

BOOK NOTES

How to Raise Rabbits for Food and War—By Frank G. Ashbrook, In Charge, Fur Resources, Fish and Wildlife Service, United States Department of the Interior.

This helpful book will tell you all about raising rabbits profitably for meat and fur of high quality. Rabbit meat for the family, its importance in the Food for Freedom campaign, back yard rabbitry for home consumption, how to make a start, location of the rabbitry, and choosing a breed are all discussed in this book. The care and feeding of the doe and her litter, and the fattening of the young for market are given in detail. The killing, dressing and marketing of rabbits, advising how to dispose of the meat and fur to best advantage are discussed fully.

Publishers: Orange Judd Publishing Co., Inc. 256 pages. $2.00.

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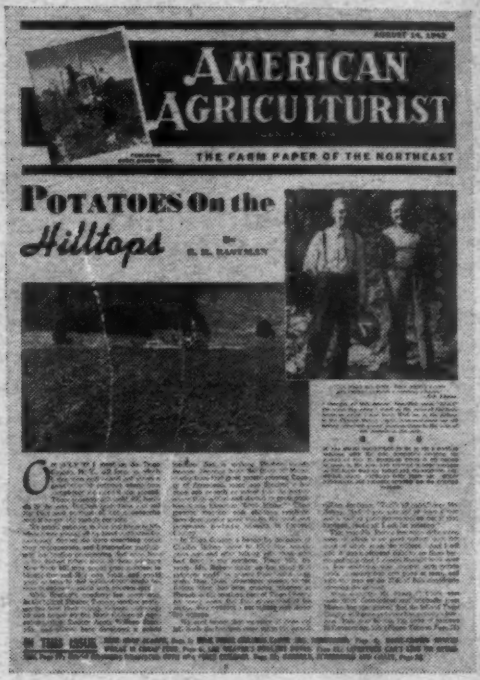
AUGUST 24, 1942

AMERICAN AGRICULTURIST

THE FARM PAPER OF THE NORTHEAST

POTATOES On the Hilltops

By E. R. EASTMAN

AMERICAN AGRICULTURIST

The **American Agriculturist** editorial, circulation and advertising offices are in the Savings Bank Building, Ithaca, N. Y. The printing plant is at Poughkeepsie, N. Y. Editor, E. R. Eastman; Circulation Manager, E. C. Weatherby; Advertising Manager, I. W. Ingalls. Subscription price $.50 a year.

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It is the only farm publication owned by its readers. All the common stock is owned by the **American Agriculturist Foundation, Inc.,** with the provision that profits after expenses are paid shall be used to foster agricultural education and research. Revolving scholarship funds have been set up for students of agricultural and home economics in Northeastern colleges.

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